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F-22 COST CONTROLS

HEARING

BEFORE THE

SUBCOMMITTEE ON NATIONAL SECURITY, VETERANS AFFAIRS, AND INTERNATIONAL RELATIONS

OF THE

COMMITTEE ON
GOVERNMENT REFORM

HOUSE OF REPRESENTATIVES

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F–22 COST CONTROLS

TUESDAY, DECEMBER 7, 1999

House of Representatives,
Subcommittee on National Security, Veterans
Affairs, and International Relations,
Committee on Government Reform,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:10 a.m., in room 2154, Rayburn House Office Building, Hon. Christopher Shays (chairman of the subcommittee) presiding.

Present: Representatives Shays, Mica, and Tierney.

Also present: Representative Chambliss.

Staff present: Lawrence Halloran, staff director and counsel; J. Vincent Chase, chief investigator; Thomas Costa, professional staff member; Jason Chung, clerk; David Rapallo, minority counsel; and Earley Green, minority staff assistant.

Mr. Shays. Good morning. I would like to call this hearing to order.

Last February, in response to our request to describe high-risk programs in the Department of Defense [DOD], the General Accounting Office [GAO], testified that unrealistic costs, schedule and performance estimates continued to plague major weapons systems acquisitions. GAO pointed specifically to cost overruns in the program to design and build the next-generation air superiority jet fighter, the F–22.

In March, GAO told Congress it was unlikely the Air Force would be able to keep the F–22 engineering and manufacturing development [EMD] program, within cost limits. They cited persistent EMD spending growth not addressed by controlled strategies and testing delays that could push costs higher still.

At that time, DOD assured the subcommittee that cost control continues to be a primary emphasis in the F–22 program and congressional mandated spending caps would not be exceeded. The Department's top acquisition reform official described, "comprehensive measures to track and control F–22 program costs." DOD promised close monitoring of Air Force efforts to cut $660 million in projected development expenses and $16 billion in estimated production spending from the $60 billion program. Nevertheless, defense authorization and appropriations bills this year reflected growing congressional unease over the price and pace of the F–22 program. A commitment to F–22 production was delayed and made contingent on sufficient preproduction testing and completion of delayed avionics development.

So today, on the 58th anniversary of the bombing of Pearl Harbor, we revisit the issues of F–22 cost control and development delays, asking how spending control strategies are being implemented and how program managers are meeting leaner budgets and tighter schedules. We do so in pursuit of our broad oversight mission to monitor programs identified as vulnerable to waste and mismanagement.

This hearing affords the subcommittee and DOD an opportunity to assess the progress and the problems of a major acquisition effort hailed by some as a model of advanced technical development, but scorned by others as vintage wasteful cold war procurement, out of sync with post-cold war national security needs.

In order to focus on current F–22 cost controls, we invited only Defense Department witnesses to testify today. At the subcommittee's request, GAO will provide testimony in specific aspects of F–22 production cost savings at a future hearing.

I want to acknowledge the work of our subcommittee colleague from Massachusetts, Congressman John Tierney, who is to my right, who has been dedicated and articulate in expressing his concerns over F–22 costs and who has been a full partner in our oversight of DOD acquisition reforms. The future of U.S. air power will be shaped by our past.

I would like to say that before we start this hearing, I would like a few moments of silence in remembrance for the 2,403 Americans and their precious families who lost their lives 58 years ago today at Pearl Harbor.

[Moment of silence.]

Mr. SHAYS. Mr. Tierney.

Mr. TIERNEY. Thank you, Mr. Chairman. Thank you for calling this hearing and following up on this issue.

Let me also welcome our witnesses here this morning. I also want to thank the General Accounting Office for providing an official statement for the record.

The Department of Defense currently is operating three aircraft development programs that some have projected to cost more than $350 billion. Many experts seem to agree that the Pentagon cannot afford all three of these programs under any reasonable potential scenario. As a result, experts from all sides have raised questions with each of these programs, such as the necessity and relevance of each program in today's post-cold war environment, the ability of each aircraft to operate between and among the various services, the continued viability of strategic uses for these aircraft and, of course, the cost of each program.

In addition to focusing on the continued increases in costs for development and production of the F–22, this hearing is also directed toward analyzing the measures utilized by the Air Force and the Department of Defense to predict and control these costs.

Although I understand the Air Force has achieved some of its performance goals for the F–22, it appears from the written statement by the General Accounting Office that program costs are continuing to rise despite the implementation of cost control measures. The broad question raised is whether the Air Force should be more realistic in terms of anticipating delays in construction, in subcontractor performance, and in software development. Looking at the record of the past 10 years, it appears that the Air Force has consistently underestimated the length of delays and increases in costs.

At some point, repeated upward adjustments cease to be unexpected. At some point, they reveal a strategy that is overly optimistic.

As with any prioritization analysis, cost concerns with the F–22 program must inform the larger questions, such as the relevance of the F–22 program in light of other ongoing aircraft development programs. Essentially, as the costs for the F–22 program continue to increase, the value of each aircraft decreases compared to other alternatives. For these reasons, I look forward to hearing from both of our witnesses about measures they are taking to predict more accurately future cost increases, as well as measures being implemented to reduce current cost estimates.

Once again, I thank the witnesses for being here and thank the chairman for conducting this hearing.

[The prepared statement of Hon. John Tierney follows:]

Opening Statement
Representative John Tierney
Subcommittee on National Security, Veterans Affairs, and International Relations

December 7, 1999

GOOD MORNING. THANK YOU MR. CHAIRMAN FOR CALLING THIS HEARING.

LET ME WELCOME OUR WITNESSES FROM THE DEPARTMENT OF DEFENSE AND THE AIR FORCE. THANK YOU ALSO TO THE GENERAL ACCOUNTING OFFICE FOR PROVIDING AN OFFICIAL STATEMENT FOR THE RECORD.

THE DEPARTMENT OF DEFENSE CURRENTLY IS OPERATING THREE AIRCRAFT DEVELOPMENT PROGRAMS THAT SOME HAVE PROJECTED TO COST MORE THAN 350 BILLION DOLLARS.

MOST EXPERTS SEEM TO AGREE THAT THE PENTAGON CANNOT AFFORD ALL THREE OF THESE PROGRAMS UNDER ANY REASONABLE POTENTIAL SCENARIO.

AS A RESULT, EXPERTS FROM ALL SIDES HAVE RAISED QUESTIONS WITH EACH OF THESE PROGRAMS, SUCH AS:

> THE NECESSITY AND RELAVENCE OF EACH PROGRAM IN TODAY'S POST-COLD WAR ENVIRONMENT,

-- THE ABILITY OF EACH AIRCRAFT TO OPERATE BETWEEN AND AMONG THE VARIOUS SERVICES.

-- THE CONTINUED VIABILITY OF STRATEGIC USES FOR THESE AIRCRAFT, AND, OF COURSE,

-- THE COSTS OF EACH PROGRAM

IN ADDITION TO FOCUSING ON THE CONTINUED INCREASES IN COSTS FOR DEVELOPMENT AND PRODUCTION OF THE F-22, THIS HEARING IS ALSO DIRECTED TOWARDS ANALYZING THE MEASURES UTILIZED BY THE AIR FORCE AND THE DEPARTMENT OF DEFENSE TO PREDICT AND CONTROL THESE COSTS

ALTHOUGH I UNDERSTAND THE AIR FORCE HAS ACHIEVED SOME ~~MANY~~ OF ITS PERFORMANCE GOALS FOR THE F-22, IT APPEARS FROM THE WRITTEN STATEMENT BY THE GENERAL ACCOUNTING OFFICE THAT PROGRAM COSTS ARE CONTINUING TO RISE DESPITE THE IMPLEMENTATION OF COST CONTROL MEASURES.

THE BROAD QUESTION RAISED IS WHETHER THE AIR FORCE SHOULD BE MORE REALISTIC IN TERMS OF ANTICIPATING DELAYS IN CONSTRUCTION, IN SUBCONTRACTOR PERFORMANCE, AND IN SOFTWARE DEVELOPMENT

LOOKING AT THE RECORD OF THE PAST TEN YEARS, IT APPEARS THAT THE AIR FORCE HAS CONSISTENTLY UNDERESTIMATED THE LENGTH OF DELAYS AND INCREASES IN COSTS.

AT SOME POINT, REPEATED UPWARD ADJUSTMENTS CEASE TO BE "UNEXPECTED."

AT SOME POINT, THEY REVEAL A STRATEGY THAT IS OVERLY OPTIMISTIC.

AS WITH ANY PRIORITIZATION ANALYSIS, COST CONCERNS WITH THE F-22 PROGRAM MUST INFORM THE LARGER QUESTIONS, SUCH AS THE RELEVANCE OF THE F-22 PROGRAM IN LIGHT OF OTHER ONGOING AIRCRAFT DEVELOPMENT PROGRAMS.

ESSENTIALLY, AS THE COSTS FOR THE F-22 PROGRAM CONTINUE TO INCREASE, THE VALUE OF EACH AIRCRAFT DECREASES COMPARED TO OTHER ALTERNATIVES.

FOR THESE REASONS, I LOOK FORWARD TO HEARING FROM BOTH OF OUR WITNESSES ABOUT MEASURES THEY ARE TAKING TO PREDICT MORE ACCURATELY FUTURE COST INCREASES, AS WELL AS MEASURES BEING IMPLEMENTED TO REDUCE CURRENT COST ESTIMATES.

ONCE AGAIN, I THANK THE WITNESSES FOR BEING HERE.

Mr. SHAYS. Before swearing our witnesses, we just have a little housekeeping.

I ask unanimous consent that all members of the subcommittee be permitted to place any opening statement in the record and that the record remain open for 3 days for that purpose. Without objection, so ordered.

I ask further unanimous consent that all witnesses be permitted to include their written statement in the record; and without objection, so ordered. And I ask further unanimous consent that written statements submitted by the General Accounting Office by Representative Bob Barr of Georgia and by Representative Saxby Chambliss of Georgia be printed in the hearing record.

Without objection, so ordered.

[The prepared statement of Hon. Bob Barr and the information referred to follow:]

The F-22 Raptor: Setting the Standard for Defense Contracts

By : U.S. Representative Bob Barr (GA-7)

December 7, 1999

Mr. Chairman, I appreciate your holding this hearing today, and I thank you for giving me the opportunity to set the record straight about the F-22 program.

In their zeal to oppose the F-22 Raptor, some critics of the program have resorted to the inaccurate argument that the program is plagued by massive problems. Sadly, they are often assisted by many in the national media who refuse to believe the defense industry has successfully reformed many of the procurement problems that made headlines years ago.

It is simply not the case that the F-22 has experienced unusual cost overruns, production problems or testing delays. In fact, from day one, the F-22 procurement process has served as a model for effective, thrifty and efficient contractual relationships between the Pentagon and the defense industry. It is one thing for opponents of the program to make an honest effort to argue we don't need the F-22. It is another matter entirely for critics to inaccurately argue the program is being mismanaged.

The facts are clear. The F-22 flight test program is proceeding extremely well, with the first two flight test aircraft having completed over 470 hours of productive flight testing. Flight test results of the engines and aircraft have closely matched predictions, giving us further reason to be confident as the flight envelope continues to expand. Additionally, the F-22 program completed all program criteria for 1998. As Senate Appropriations Committee Chairman Ted Stevens recently said, the F-22 is already "the most reviewed aircraft in history."

Cost overruns in the F-22 development program amount to $3.5 billion, which amounts to about 5% of the total program cost. Of these overruns, 41% or $1.55 billion, were caused by congressional funding changes. There is a clear principle at work here. Every time Congress changes its mind about the funding parameters it has set, a ripple effect requires changes the program and often causes delays, which cost money. If critics of the program are looking for explanations for overruns, they need look no further than Congress for a large part of the answer.

In addition to inaccurately arguing the program is mismanaged, some critics charge that the

F-22 carries an overall price tag that is too high even without overruns. This is not the case either.

The Air Force estimates that the total 20-year cost to develop and build the F-22 is $63 billion (not accounting for inflation). In constant 1999 dollars, the total development and production cost of each of the 341 F-22s would be $172 million. Since the plane has been under development since 1991, much of this money has already been spent. The cost to actually build each F-22, which does not include R&D costs, is estimated at only $85 million.

Since we've already spent billions to develop this aircraft -- which is the most expensive step for the program -- it seems extraordinarily shortsighted to attack the program now. In real world terms, this would be the equivalent of agreeing to purchase a top of the line Cadillac, making years of payments on it, and then trading it in for a loss on a used Yugo when you get close to paying it off.

With an average aircraft "sticker price" of less that $85 million, the F-22 will cost less than one percent of the Department of Defense budget during its production period. In its most costly year -- 2003 -- the F-22 will consume less than 5.6 percent of the Air Force budget; 1.7 percent of the defense budget; and 0.25 percent of the total federal budget. Air superiority is the foundation of practically every American battle plan on the books. When you consider the importance of its task, the portion of the defense budget we are committing to it is quite small.

While it may be true the F-22 costs twice as much to produce as the F-15, this analysis fails to consider two significant factors. First, the fact that F-15's have been produced in such large volume for more than two decades has substantially lowered the per-unit production cost of the aircraft. I have no doubt that purchasing more F-22's would substantially narrow the cost gap between the two aircraft. Of course, it goes without saying that attempts by Congress to lower overall procurement below the Air Force request would further widen the gap between the two programs.

Secondly, without the F-22, the F-15 would have to be upgraded to the point that it becomes -- for all practical purposes -- a new aircraft. Remember, at least four other aircraft in development around the world will equal or exceed the capabilities of the F-15, which is approaching 25 years of age. Factoring in upgrade costs to keep the F-15 competitive, the gap between the two programs shrinks to nothing.

The House and Senate Armed Services Committees, which have direct oversight responsibility for the program have stated publicly that they are confident cost overruns are being addressed. The appropriate oversight is mandated, and if Lockheed does not stay within strictly controlled caps, the company must either make up the difference or cancel the program.

In a letter to Congress during the F-22 debate, Secretary of Defense William Cohen told us that "[c]anceling the F-22 program means we cannot guarantee air superiority in future conflicts." Six former Secretaries of Defense have echoed Secretary Cohen's words, calling the F-22 a "essential" program that must be fully funded. These are the true defense experts in Washington, and I would humbly suggest that Congress try listening to them for a change.

Again, thank you for holding this hearing today, and allowing me to submit these comments for the record.

United States General Accounting Office

GAO

Testimony

Before the Committee on Government Reform,
Subcommittee on National Security, Veterans Affairs, and
International Relations, House of Representatives

For Release Expected
At 10:00 a.m. EST
Tuesday,
December 7, 1999

DEFENSE ACQUISITIONS

Progress in Meeting F-22 Cost and Schedule Goals

Statement for the Record by Louis J. Rodrigues, Director,
Defense Acquisitions Issues, National Security and
International Affairs Division

Mr. Chairman and Members of the Subcommittee:

Thank you for the opportunity to submit this statement for the record. The Subcommittee requested that we provide information on the status of cost and schedule issues of the Air Force's F-22 aircraft development and procurement program.

As directed by the National Defense Authorization Act for Fiscal Year 1998, we reported to the Congress in March 1999 about the extent to which cost, schedule, and performance goals were being met in the F-22 engineering and manufacturing development (EMD) program.[1] That report was supplemented by testimony before the Subcommittee on Airland Forces of the Senate Armed Services Committee in March 1999.[2] This statement summarizes the relevant parts of that report and testimony, describes the congressional actions on the fiscal year 2000 budget request, updates the information we provided to the Congress in March 1999, and discusses Air Force and contractor initiatives to control production costs. Appendix I lists products we have issued that relate to the F-22 program.

The National Defense Authorization Act for Fiscal Year 1998 established cost limits for F-22 EMD and production. The act instructed the Secretary of the Air Force to adjust the cost limits for economic inflation and compliance with changes in federal, state, and local laws. In December 1999, the cost limits, as adjusted, were $18.880 billion for EMD and $39.759 billion for production. The production cost limit does not specify a quantity of aircraft.

RESULTS IN BRIEF

In March 1999 we reported that it was unlikely the Air Force would be able to keep the F-22 EMD program, as planned, within the cost limit established by the Congress. In addition, we expressed concern about the significant reduction the Air Force had made in the testing it planned to complete before awarding contracts to initiate advance procurement to accelerate F-22 production.

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[1] F-22 Aircraft: Issues in Achieving Engineering and Manufacturing Development Goals (GAO/NSIAD-99-55, Mar. 15, 1999).
[2] Defense Acquisitions: Progress of the F-22 and F/A-18E/F Engineering and Manufacturing Development Programs (GAO/T-NSIAD-99-113, Mar.17, 1999).

Both authorization and appropriations acts for fiscal year 2000 established further congressional direction for the F-22 program. For example, the authorization act required certification by the Secretary of Defense, prior to beginning low-rate initial production, that the EMD test plan is adequate for determining F-22 operational effectiveness and suitability. The appropriations act did not approve the beginning of F-22 low-rate initial production but approved funding for acquisition of additional flight-test aircraft with research, development, test and evaluation funding.

The F-22 Program has made progress in manufacturing and testing aircraft. However, there continues to be several important issues regarding the cost of the EMD and production programs and the schedules for completion of EMD activities leading to production of F-22s in higher quantities. For example, preliminary indications from our ongoing review of the EMD program's status show that, compared to the program's status in March 1999, sufficient cost reductions have not been implemented to ensure that EMD activities, as planned, can be completed within the cost limitation, and completion dates for testing F-22 aircraft may be further delayed. Our evaluation of the Air Force's progress in meeting cost, schedule, and performance goals is continuing as directed in the National Defense Authorization Act for Fiscal Year 1998. We plan to issue a report to the Congress concerning our current evaluation by March 15, 2000.

In 1997, the Air Force indicated that the most probable cost for production of 438 F-22 aircraft would exceed its cost estimate by $13 billion. The Air Force plans to implement initiatives to offset this projected cost increase. As requested by this Subcommittee, we have initiated a review of the Air Force's and prime contractor's efforts to reduce production costs.

EMD PROGRAM STATUS AS OF MARCH 1999

In March 1999, the Air Force estimated it could complete the F-22 EMD program within the congressional cost limit of $18.880 billion. However, during 1998, contractor costs had exceeded budgets; in addition, work had not always been completed as scheduled. The Air Force and F-22 contractor had identified potential cost growth totaling $667 million. We reported that F-22 EMD costs would rise above the cost limit if this potential cost growth was not addressed. At that time, the Air Force and contractor were developing ways to reduce the costs, such as improving efficiency and deferring or reducing program activities to keep EMD costs within the congressional limit.

Our March 1999 report and testimony also identified several other issues that could affect the Air Force's ability to complete the program within the cost limit:

- The contractor had notified the Air Force that F-22 program costs could increase further if sales of C-130J aircraft, which are manufactured in the same plant as the F-22, were lower than anticipated because the F-22 Program would have to absorb a higher than planned share of the plant's overhead costs.
- First flights of the third through the sixth test aircraft were expected to be late, reducing the time available to accomplish flight-tests before planned completion of EMD and potentially requiring extension of EMD.
- Development of the F-22's integrated avionics systems had been delayed and the schedule for completing avionics development appeared unrealistic. If EMD completion were to be extended to complete avionics development, additional costs would be incurred.
- Completing static and fatigue tests on the airframe structure had been delayed. Problems identified during these tests could require additions to planned EMD activities.

In addition, we reported that the Air Force had substantially reduced the flight-testing hours it had planned to accomplish before awarding production contracts. This would increase the risk of entering production.

AUTHORIZATION AND APPROPRIATIONS ACTIONS ASSOCIATED WITH FISCAL YEAR 2000 BUDGET REQUEST

For fiscal year 2000, the Air Force requested $1.6 billion for low-rate initial production of six F-22 aircraft. Both authorization and appropriations acts for fiscal year 2000 established further congressional direction for the F-22 Program. The authorization act required that, before beginning low-rate initial production, the Secretary of Defense must certify that the EMD test plan is adequate for determining F-22 operational effectiveness and suitability; and that both EMD and production can be executed within the respective cost limits. The appropriations act, among other provisions affecting the F-22 program, did not approve the beginning of F-22 low-rate initial production but approved funding for acquisition of additional flight-test aircraft with research, development, test and evaluation funding. The appropriations act restricted award of a fully funded contract to begin low-rate initial production until (1) the first flight of an F-22 incorporating block 3 avionics software has been conducted; (2) the Secretary of Defense certifies to the congressional defense committees that criteria identified in the act for the award of low-rate initial production have been met; and (3) the Director of Defense Operational Test and Evaluation reports on the adequacy of testing to date to measure and predict performance of F-22 avionics systems, stealth characteristics, and weapons delivery systems.

CURRENT EMD PROGRAM STATUS

Before I discuss the current EMD program, I need to point out that the congressional actions on the fiscal year 2000 budget for the F-22 program could require changes to the F-22 program that have not, at this time, been fully defined. Accordingly, our comments regarding the program may change as the Air Force and Department of Defense change the program and the relationships between EMD activities and initiation of the production phase of the F-22 Program. The F-22 Program has made progress in manufacturing and testing aircraft; however, there continues to be several important issues regarding the cost of the EMD and production programs, and the schedules for completion of EMD activities that are intended to lead to production of F-22s in higher quantities. Preliminary indications from our ongoing review of the EMD program's status are that, compared to the program's status in March 1999, (1) sufficient cost reductions have not yet been implemented to ensure that EMD activities, as planned, can be completed within the cost limitation; (2) the impact on the F-22 program of lower than planned C-130J sales has not been determined; (3) deliveries of F-22 test aircraft have been further delayed; (4) fiscal year 2000 actions by the Congress increased the time available to test F-22s before beginning low-rate initial production; (5) some avionics milestones have been further delayed; (6) the avionics schedule planned by the Air Force still appears to be unrealistic; and (7) completion dates for testing of ground test articles have been further delayed. I will now discuss each of these areas in greater detail.

Mitigation of Identified Cost Growth in EMD Program

According to the Air Force, $536.7 million (about 80 percent) of the identified $667 million in F-22 EMD cost growth has been mitigated through implementation of various cost reduction initiatives. These initiatives are designed to reduce costs by improving efficiency and deferring or reducing program activities. However, the cost growth to be mitigated could be larger than previously determined. The Air Force provided us information showing that the potential cost growth may increase. We are reviewing the Air Force's identification of and plans to mitigate this additional cost growth.

Potential Impact if C-130J Sales Are Lower Than Planned

Because of the lower than anticipated sales of the C-130J cargo aircraft by Lockheed Martin, the F-22 program may have to absorb a higher share of the Lockheed Martin plant's overhead costs. Lockheed Martin produces both the C-130J cargo aircraft and the F-22 aircraft in its Marietta, Georgia, plant. The agreement in effect in March 1999 between

Lockheed Martin and the Air Force concerning the distribution of plant overhead costs for both the C-130J and the F-22 program was predicated on the production of 24 to 25 C-130J aircraft per year. However, 19 C-130J aircraft were produced in calendar year 1999, and production for calendar years 2000-2003 is estimated at about 17 aircraft per year. Reductions in C-130J aircraft produced could result in higher amounts of overhead costs being absorbed by the F-22 program.

Delays In Delivering Test Aircraft

The 1997 flight-test plan included about 250 flight-test months.[3] In March 1997, we testified that because of manufacturing problems, several flight-test aircraft would be delivered late, resulting in 16.9 fewer flight-test months available through scheduled completion of EMD. In June 1999, the Air Force acknowledged further delays in the delivery of most of the flight-test aircraft due to continuing wing delivery problems. As a result of the further delay, there are now almost 29 fewer flight-test months available. If the test program were to be extended, the cost of EMD would increase.

We are concerned that additional delivery delays may further reduce flight-test months available to complete flight-testing. For example, Lockheed Martin recently reported that wing deliveries may be further delayed. Flight-test time is essential for the program to test and prove specific features of the aircraft as well as to reduce the risk to the government as commitments are made to production.

Congressional Actions Allow For More
Testing Time Prior to Low-rate Initial Production

Because of delays in the EMD program, the Air Force substantially reduced the amount of flight-testing planned before beginning production. At the beginning of 1999, the program goal was to complete a total of 519 flight-test hours by the end of 1999. Even though the Air Force is close to reaching this goal, as we reported in March 1999, earlier plans scheduled many more flight-test hours for completion by December 1999, which at the time, was the planned date of the first low-rate initial production contract award. The actions of the Authorization and Appropriations Committees on the fiscal year 2000 budget delayed the beginning of production until certain conditions are met. As a result, more time is available to complete flight-tests, therefore reducing risks before the decision is made to commit to low-rate initial production. As the Air Force makes changes to the F-22 Program to reflect fiscal year 2000 congressional actions, we will continue evaluating the relationships of EMD, testing, and production commitments.

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[3] A flight-test month is one flight-test aircraft available for 1 month.

Avionics Milestones Are Further Delayed

We reported in March 1999 that development of avionics systems for the F-22 was behind the schedule established in 1997. Development problems with the communication, navigation and identification system, and, to a lesser extent, the electronic warfare system caused schedule delays and cost growth in avionics development. Because of these problems, the Air Force did not complete the first major avionics segment, known as block 1, until May 1999, 4 months behind schedule. Furthermore, we reported in March 1999 that the first flight of the first avionics test aircraft with block 1 avionics was scheduled for February 2000, but this event is now scheduled for May 2000. Flight-testing of the next scheduled avionics segment, known as block 2, is also expected to be delayed.

Avionics Schedule Still Appears Unrealistic

In 1997, an evaluation team concluded that avionics development could take more time than planned because of delays in avionics blocks 1, 2, 3, and 3.1. Even though block 1 was completed[4] behind schedule and block 2 is expected to be completed behind schedule, the current avionics schedule shows blocks 3 and 3.1 avionics being completed 6 and 3 months, respectively, before the completion dates the Air Force and the evaluation team considered realistic in 1997. If blocks 3 and 3.1 take longer than planned to be completed, additional costs will be incurred.

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[4] That is, completed to the point it is placed on an EMD aircraft in preparation for flight-testing.

Further Delays in Testing of Ground Test Articles

Two major tests of F-22 airframe structural integrity continue to be delayed. These are static testing, designed to ensure the aircraft can withstand flight stresses, and fatigue testing, which involves subjecting the aircraft to the structural stresses expected within its planned life. Static tests have been delayed 12 months and fatigue tests have been delayed 14 months. These are longer delays than the Air Force expected in March 1999. The following table shows the continuing delays in completing these tests by comparing the schedules in 1997, March 1999, and as of November 1999.

Delayed Completion Dates for Static and Fatigue Testing

Test	1997 schedule	March 1999 schedule	Schedule as of November 1999
Static	October 1999	February 2000	October 2000
Fatigue	December 1999	September 2000	February 2001

F-22 PRODUCTION COST REDUCTION INITIATIVES

Concerned about growing costs of the F-22 Program, the Assistant Secretary of the Air Force for Acquisition, in June 1996, established a team to estimate the most probable costs of the F-22 EMD and production programs. The team estimated, in January 1997, that the production costs for 438 F-22s would increase by $13.1 billion to about $61.2 billion. The team identified cost reduction initiatives that it expected to offset the production cost increase. DOD subsequently reduced the planned procurement quantity to 339 aircraft. On November 23, 1999, this Subcommittee asked us to review the progress the Air Force and the contractors have made in implementing cost reduction initiatives needed to remain within the production cost limit for the program. We have initiated the requested review.

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This concludes our statement. We appreciate the opportunity to have it placed in the record.

Contact and Acknowledgment

For future contacts regarding this statement, please contact Louis J. Rodrigues at (202) 512-4841. Individuals making key contributions to this statement included Marvin Bonner, Todd Brannon, Edward Browning, Leonard Benson, Allen Li, Robert Murphy, and Don Springman.

RELATED GAO PRODUCTS

Fiscal Year 2000 Budget: DOD's Procurement and RDT&E Programs(GAO/NSIAD-99-233R, Sep. 23, 1999).

Budget Issues: Budgetary Implications of Selected GAO Work for Fiscal Year 2000 (GAO/OCG-99-26, Apr. 16, 1999).

Defense Acquisitions: Progress of the F-22 and F/A-18E/F Engineering and Manufacturing Development Programs (GAO/T-NSIAD-99-113, Mar. 17, 1999).

F-22 Aircraft: Issues in Achieving Engineering and Manufacturing Development Goals (GAO/NSIAD-99-55, Mar. 15, 1999).

F-22 Aircraft: Progress of the Engineering and Manufacturing Development Program (GAO/T-NSIAD-98-137, Mar. 25, 1998).

F-22 Aircraft: Progress in Achieving Engineering and Manufacturing Development Goals (GAO/NSIAD-98-67, Mar. 10, 1998).

Tactical Aircraft: Restructuring of the Air Force F-22 Fighter Program(GAO/NSIAD-97-156, June 4, 1997).

Defense Aircraft Investments: Major Program Commitments Based on Optimistic Budget Projections (GAO/T-NSIAD-97-103, Mar. 5, 1997).

F-22 Restructuring (GAO/NSIAD-97-100BR, Feb. 28, 1997).

Tactical Aircraft: Concurrency in Development and Production of F-22 Aircraft Should Be Reduced (GAO/NSIAD-95-59, Apr. 19, 1995).

Air Force Embedded Computers (GAO/AIMD-94-177R, Sept. 20, 1994).

Tactical Aircraft: F-15 Replacement Issues(GAO/T-NSIAD-94-176, May 5, 1994).

Tactical Aircraft: F-15 Replacement Is Premature as Currently Planned(GAO/NSIAD-94-118, Mar. 25, 1994).

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Mr. SHAYS. At this time I will call our witnesses. Dr. George Schneiter, Director of Strategic and Tactical Systems, Department of Defense; and then Darlene Druyun, Deputy Air Force Under Secretary, U.S. Air Force, Department of Defense.

If I could, I would invite both witnesses to stand up. As you know, we swear all our witnesses and even Members of Congress who testify before the committee. If you would raise your right hands, please.

[Witnesses sworn.]

Mr. SHAYS. I would note for the record that both our witnesses have responded in the affirmative.

Dr. Schneiter, I think you are going first.

Mr. SCHNEITER. Yes, sir.

Mr. SHAYS. My understanding is that you have a shorter testimony. I am going to put the clock on for 5 minutes, but you just go on. I will just turn it over again.

I understand, Ms. Druyun, that your statement will be about 20 minutes, which we are happy to have you put on the record and to listen to.

Mr. Chambliss, you are more than welcome to be up here if you would like. We would be happy to have you.

We will allow you to speak for the 20 minutes. After the 20 minutes, we will give you a warning. We would just note for the record that Mr. Chambliss is here and it is nice to have you here.

Thank you for coming. Dr. Schneiter, thank you for being here.

STATEMENT OF DR. GEORGE SCHNEITER, DIRECTOR OF STRATEGIC AND TACTICAL SYSTEMS, DEPARTMENT OF DEFENSE

Mr. SCHNEITER. Thank you, Mr. Chairman. I appreciate the opportunity to discuss today the Department of Defense's efforts to control the costs and adhere to the schedule of the F–22 aircraft program. I would just comment on a few things from my written statement, which will go into the record, as you said earlier.

The F–22 is a technically challenging program. The F–22 is intended to have unprecedented capabilities in the areas of low observability, the ability to fly supersonically without afterburner and advanced avionics and sensors. It is intended to ensure that our air forces remain dominant in the 21st century.

Such a program naturally gives us challenges regarding cost and schedule performance. We have several oversight and budgeting processes within the Department that we use to address such challenges, and I will summarize the principal ones of these. These tools are intended to provide the Secretary of Defense and his staff the information that he and they need to monitor, control, and reduce costs and to maintain program schedules.

The first process I would mention is where all programs begin, with the requirements process. The senior military leadership on the Joint Requirements Oversight Council address cost and schedule in establishing the military justification for an acquisition program. This Joint Requirements Oversight Council, which is chaired by the vice chairman of the Joint Chiefs of Staff and includes military service vice chiefs, focuses on ensuring that the programs are affordable and can be fielded in a timely manner. They now require that costs be a required parameter among the formal requirements for weapons systems. That is the requirements process.

The second has to do with the acquisition process and, in particular, the Defense Acquisition Board. This is chaired by the Under Secretary of Defense for Acquisition, Technology, and Logistics, my boss, Dr. Gansler. It includes other senior officials in the Office of the Secretary of Defense, and the vice chairman of the Defense Acquisition Board is the vice chairman of the Joint Chiefs of Staff, who also chairs the Joint Requirements Oversight Council. So we have his participation from a requirements point of view in this acquisition forum.

The Defense Acquisition Board [DAB], meets before major transition points, or milestones, as the program progresses through each phase of development and production. Cost and schedule considerations are a major focus of a DAB review. Different offices within the Department bring material to be considered at those meetings.

Foremost among these in the cost area is the Office of the Secretary of Defense's Cost Analysis Improvement Group. They provide an independent cost estimate. By "independent," we mean it is independent of the military service, it is independent of the program office. This ensures that senior officials receive the most candid and complete information about the cost of weapons acquisition programs.

We also conduct, as part of such milestone reviews, an affordability analysis which looks at the cost of the program in the context of the overall budget and, particularly, the mission area for that program. So that is the DAB process, which is geared to milestones in a program.

A third process is a more routine process of review of programs. This is the Defense Acquisition Executive Summary process. This, on a quarterly basis, highlights to the Under Secretary the cost, schedule, technical performance, management, and other key parameters of major defense acquisition programs. It includes examining what is called an "earned value management system," which is a way of tracking cost and schedule according to the plan to complete distinct packets of work. Mrs. Druyun will show you some examples of such tracking information.

The fourth Department review is our review of the adequacy of the overall defense program in what we call the "Planning, Programming and Budgeting System." This is the system whereby we prepare the annual budget which we bring to the Congress each year. This is not just for 1 year, but includes the Future Years' Defense Program of 5 or 6 years.

Initial proposals for this budget come to us from the military departments. We then evaluate those in our summer program review and, finally, the Defense Resources Board, which the Deputy Secretary of Defense chairs, considers alternative approaches that might provide improved overall effectiveness within the available funds. These reviews consider the balance among force structure modernization, such as the F–22 readiness and sustainability, and seek to accomplish the established policy goals within the available funds. The Department's tactical aircraft programs are often included in detail in these reviews. These are all parts of the Department's internal process.

We also report to Congress on program costs, and annually we send over the Selected Acquisition Report, which provides cost, schedule and other major information about our programs. Dr. Gansler also holds program reviews more often than the processes I just described for high-priority programs. The F–22 falls in this category, and in fact he has a review of the F–22 scheduled for this coming Thursday, 2 days from now.

When Dr. Gansler decided in December 1998, a year ago, to approve the go-ahead for two aircraft, he reiterated the importance of maintaining continued emphasis on the F–22 program within the congressional cost caps. He challenged the Air Force and its contractors to continue efforts to reduce costs; and he directed the Air Force to provide him with quarterly briefings on development and production cost status. In this manner, he has been able to track cost and schedule variances, the cost of each development aircraft being produced compared to the projected cost, and the status of individual cost-reduction plans for both development and production.

To date, trends in cost and schedule have shown some improvement, but I think it is fair to say the jury is still out on the ability of these cost-reduction plans to produce all the savings we need to stay within the caps. Continuation of these quarterly reviews will give us added confidence that the decisionmakers have the best information at each milestone decision on the ability of the Air Force to execute the F–22 program as planned.

Mr. Chairman, those are the points I wanted to highlight. I will be happy to respond to any questions you may have.

Mr. SHAYS. Thank you very much.

[The prepared statement of Mr. Schneiter follows:]

TESTIMONY

OF

DR. GEORGE R. SCHNEITER

Director, Strategic and Tactical Systems

TO THE

HOUSE COMMITTEE

ON

GOVERNMENT REFORM

December 7, 1999

Mr. Chairman, members of the committee, thank you for the opportunity to appear today to discuss the Department of Defense's efforts to control the costs and adhere to the schedule of the F-22 aircraft program.

As you know, the F-22 is a technically challenging development program with the goal of producing a tactical fighter aircraft with unprecedented capabilities in the areas of low observability, the ability to fly supersonically without afterburner, and advanced avionics and sensors. The F-22 is intended to assure that our air forces remain dominant in the 21st century.

The program is currently progressing well technically, with two developmental aircraft already in flight tests. Four more flight test aircraft, including the initial avionics flight test platform, are scheduled for delivery in calendar year 2000.

A program as technically challenging as the F-22 brings with it a concomitant challenge regarding cost and schedule performance. This challenge was made more difficult by Section 217 of the National Defense Authorization Act for Fiscal Year 1998. That statutory language imposed separate cost caps on the Engineering and Manufacturing Development (EMD) phase ($18.88 billion) and on the production phase ($39.76 billion) of the program.

The Department has several senior-level management, oversight, and budgeting processes and reporting and documentation mechanisms that it uses to address the challenges of the F-22 and of any other major defense acquisition program.

These tools are intended to provide the Secretary of Defense and his staff with the information he needs to monitor, control, and reduce costs and maintain program schedules.

The principal processes used by the Department are the Requirements Process, the Defense Acquisition Board (DAB) process, the Defense Acquisition Executive Summary (DAES) process, and the Planning, Programming, and Budgeting System (PPBS). The Department also gives special attention to cost containment and reduction on particular programs.

The requirements process first confronts both cost and schedule issues, as the senior military leadership on the Joint Requirements Oversight Council (JROC) addresses cost and schedule in establishing the military justification for an acquisition program.

With constrained defense budgets, the JROC is particularly focused on whether weapons programs are affordable, and whether they can be fielded in a timely manner. Cost is now a required parameter that must be included in formal requirements for weapons systems.

The DAB acquisition process is a milestone-based review and decision mechanism that considers the cost, schedule, and technical content of major defense acquisition programs. The DAB is an advisory group to the person chairing it, the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)). It also includes other senior officials in the Office of the Secretary of Defense (OSD), the Joint Staff, and the Military Departments, and importantly, the Vice Chairman of the DAB is the Vice Chairman of the Joint Chiefs of Staff who also chairs the Joint Requirements Oversight Council.

At a minimum, the DAB meets before major transition points, or “milestones,” as a program progresses through each discrete phase of development and production. Cost and schedule considerations are a major focus at each DAB review, and the several staff offices within OSD that assess programs from these perspectives support the Under Secretary in this process.

For example, at the development and production milestones, OSD's Cost Analysis Improvement Group (CAIG) provides an independent cost estimate. The CAIG's independent cost estimates provide useful cost information to DoD decision-makers. The CAIG estimates are intended primarily as internal working documents to ensure that senior officials receive the most candid and complete information about weapons acquisition programs.

Views are also provided by other offices which might have significant perspectives regarding cost and schedule. For example, the Office of Program Analysis and Evaluation and the Office for Acquisition Resources and Analysis jointly perform an affordability analysis that considers the affordability of each major weapon system program in a broader context.

The third major process is the DAES, which on a quarterly basis, highlights to the Under Secretary the cost, schedule, technical performance, management, and other key parameters of major defense acquisition programs. The DAES Summary Report is an internal document highlighting program status and often containing what is termed "Earned Value Management System" information. "Earned value" information is the most up to date set of metrics we use to assess cost and schedule performance, and it is a methodology employed by some of the most successful American corporations.

Finally, the Department reviews the adequacy of the overall defense program in the Planning, Programming, and Budgeting System or PPBS. PPBS encompasses policy planning; long-range programming of forces, personnel, and funding; and near-term budgeting. The PPBS provides in its programming phase for the development of detailed program plans that are identified in the Future Years Defense Program (FYDP), a multi-year plan updated on an annual basis (the full six-year plan is updated every other year, with only the five remaining years updated in the so-called "offyear" review). Initial proposals for each year's updated FYDP come from the Military Departments in their Program Objective Memoranda (POMs). The overall balance of these POMs is evaluated in the summer Program Review, culminating in Defense Resources Board (DRB) consideration of alternative approaches that might provide improved overall effectiveness within available funds. These reviews of the service POMs consider the balance among force structure, modernization, readiness, and sustainability, seeking to accomplish the established policy goals within available funds. The Department's tactical aircraft programs are included in the potential scope of these reviews, although specific issues raised to the DRB in any given year may or may not include specific tactical air force modernization topics. Specific issues can vary significantly from year to year depending upon the circumstances.

Throughout these deliberations, as Ms. Druyun can attest, OSD spends significant time examining and understanding the cost and schedule projections presented by each armed service for each of its programs at issue.

What I described above refers to the Department's internal process. We also make reports to Congress on program costs. The Selected Acquisition Report is a document required from the Department by the Congress to provide it with cost, schedule, and other information about major development and procurement programs.

The Under Secretary also holds program reviews more often for high priority programs. In fact, a Defense Acquisition Executive program review for the F-22 is scheduled for Thursday (December 9) as part of the regular oversight process in the Department.

In addition, the Acquisition Decision Memorandum that was signed by the USD(AT&L) subsequent to the decision in December 1998 approving the go-ahead for production of the two aircraft lot reiterated the importance of maintaining continued emphasis on executing the F-22 program within the congressional cost caps.

The USD(AT&L) challenged the Air Force and its contractors to continue efforts to reduce costs. He also directed the Air Force to provide him with quarterly briefings on development and production cost status. The Department has used these special reviews to examine cost and schedule trends over shorter periods and to track program status to a higher degree of fidelity.

For example, the USD(AT&L) has been able to track cost and schedule variances, the actual costs of each EMD aircraft being produced (compared to the projected cost), and the status of the individual Development Cost Reduction Plans (DCRPs) and the Production Cost Reduction Plans (PCRPs).

Trends to date in cost and schedule variances have shown some improvement, but the "jury is still out" on the ability of the DCRPs and PCRPs to produce the cost savings needed to ensure performance under the caps. Continuation of these quarterly USD(AT&L) reviews will give us added confidence that the decision-makers have the best information at each milestone decision on the ability of the Service to execute the F-22 program as planned, and within the cost caps.

Finally, in structuring an acquisition strategy for our programs, we make every effort to include the concept of competition as both a mechanism to control program costs and to maintain a viable defense industrial base. This can be in the form of a "head-to-head" competition, or in the case where we have already down-selected to a single contractor, we try to take advantage of a "dissimilar' competition. Mr. Chairman, all of these tools have been used, and will continue to be used, to ensure that the F-22 program will be accomplished for an acceptable cost and on an acceptable schedule.

The Department's senior leadership believes it has made a commitment to the Congress and the American taxpayer to achieve this objective.

I will be happy to answer any questions you and the other members may have.

Mr. SHAYS. Ms. Druyun. Am I pronouncing your name correctly?

Ms. DRUYUN. It is Druyun, yes.

Mr. SHAYS. You are going to be given 20 minutes. We will let you know after that if we need to cut you shorter.

STATEMENT OF DARLEEN A. DRUYUN, PRINCIPAL DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE FOR ACQUISITION AND MANAGEMENT

Ms. DRUYUN. Thank you, Mr. Chairman.

To try to explain the F–22 program and give you a better understanding of the management and cost oversight that we have in this program, I have prepared a series of charts. I have laid out in front of you an outline that I am going to basically follow and I am going to basically skip that to really get into the meat of the material.

The first issue I wanted to just very briefly cover is the issue of why do we need the F–22. The F–22 provides air dominance over the battlefield. It is optimized for the air-to-air environment. Today, the F–22 is scheduled to replace the F–15 which is not able to operate in an advanced surface-to-air missile environment. The F–15 is at rough parity today with the Su–27 and the MiG fighter aircrafts. The F–22 attributes of stealth, supercruise, maneuverability and integrated avionics are absolutely essential for enabling dominance over the battlefield. More importantly, the F–22 complements the Joint Strike Fighter, which is optimized for ground attack.

In looking at the next chart, in looking at the current EMD cost estimate, I have broken this up into the airframe, the engine and other government costs. The total cap that we have today on the development program is $18.9 billion. What I would like to do is to peel that back further so you can understand how we are carefully managing this program to stay within the development cost cap established by the Congress back in 1998.

My next chart basically lays out a cost track history which I think is important for this committee to understand. When the original airframe development contract was awarded back in 1992, the original value was approximately $10.3 billion. Today, our current estimate to complete this program is $14.3 billion. I think it is important for this committee to understand what has caused the cost growths within this program. As you can see, I have three columns where I basically have laid out the various growths that we have experienced.

The first column is called rephase. This was driven by changes made both within the defense budget as well as within the congressional budgets that in essence stretched the program out. A total of $803 million was removed from the program which drove an overall cost increase in the range of about, almost 15 percent. The actual cost growth experienced by the contractor and which we are projecting through the completion of development is in the range of approximately 18.7 percent.

The last column entitled, “Other” is basically the work scope changes that have been laid into this program since its inception.

Turning to the development engine contract, you will see that I have laid it out in a similar fashion. Original contract value was approximately $1.5 billion. Today, our estimate to complete that program is at roughly $2.4 billion. You can see that the rephases caused by program funding instability through the congressional and defense budget cycles caused a growth of approximately 23 percent, and the contractor experienced an actual growth in the range of approximately 33 percent. I would tell you that half of this cost growth experienced by the contractor was in the hot turbine section redesign that we entered into back in 1994 because this was a durability issue.

We basically viewed it as pay-me-now or pay-me-later. For long-term operation and support cost, it made much greater sense to go back and to redesign that hot turbine section so that it would have the durability for the life of the engine.

My next chart deals with F–22 EMD costs. Back in March 1999 in front of the SASC tactical air hearing, I basically reported that our worst-case analysis in terms of cost growth above the congressionally imposed development ceiling was about $660 million. I also reported at that time that we had laid in a number of initiatives to vigorously manage this program and to offset those potential cost growths.

Back in March 1999, I reported we had offsets, dollar for dollar, for the potential cost growth. Today, I am able to report to this committee that we have identified an additional $200 million for now a total of $860 million worth of offsets to handle this worst-case shortfall that we predicted back in March 1999.

What I would like to highlight for you are the two areas that have helped to basically build on our confidence and to build a larger offset, the first one, and it is in next chart, called "Development Cost Reduction Status." Back in March 1999, I reviewed with the SASC tactical air hearing a process that we had laid in place in July 1998 to rigorously control costs. Basically what we have laid in place—as you can see, in 1999 I was predicting cost reduction savings from a variety of projects such as revamping processes to eliminate overhead, reusing EMD assets as opposed to having new assets built, some new technical approaches such as GPS. We reported about $80 million in offsets. Today, that number, as you can see, in September 1999 has grown to approximately $154 million.

I have approximately 70 projects that we carefully track, and the offset column, which is about 79 percent today, we are very, very confident of and it is actually built into our development estimate.

The next chart tracks some of the metrics that we use on a monthly basis. I would tell you that within the Air Force, for example, I conduct what we call a MER, a monthly executive review, a very detailed review with the contractor team and with our program office, and I basically drill down into multiple levels of metrics to understand exactly where we are in terms of cost, in terms of schedule and in terms of meeting the technical requirements in the program.

What this chart basically shows you is, through the completion of development, we basically have laid out a curve where we are actively managing to in terms of cost and schedule, and you would see in tracking that all the way back to August 1998 to where I am today in terms of my schedule variance, my schedule variance continues to improve. That is very, very positive.

We are seeing a cost variance running around $5.5, $6 million a month. You would note that between September and October, I had a bump-up in cost of about $11 million. The majority of that bump-up in cost was tied in with a union settlement at the Boeing Seattle facility with both their commercial and military work. Basically that represents a one-time charge in which they paid all of their employees a bonus. That is why you basically see that bump-up in the cost arena.

This is something that we watch very, very closely. As I explained to you, sir, we drill down into it to really understand what is driving these costs and what we need to do to make sure they remain contained.

My next chart is called EMD equivalent headcount. I refer to this basically as our “Slimfast” plan. As we complete each portion of the development program, it is very important that we get rid of personnel associated with the program. They have to be off-loaded from the program as their work is completed. We cannot afford to carry them along.

What we have done in this program, this is an additional set of metrics that we have laid in place, we basically have laid through the entire program, where we need to ensure that we remain within the cost cap for development. As you can see, this is a good example, Lockheed Martin Fort Worth. Basically we are tracking right along where we should be in terms of the equivalent headcount to stay within the cost cap.

I think another good news story is that overtime used to run as high as 11 percent. Today, that is running in the neighborhood of 5 to 6 percent. There have been very specific guidance and controls laid in place to control overtime. You only use it when you absolutely need to use it to be able to meet key schedule commitments.

The next chart is entitled, “Production Cost Estimate.” Today, our cost cap in our production program estimate is $39.8 billion. What I have done is to break this up between Lockheed Martin and Pratt & Whitney and to track it back to the original Joint Estimate Team, that was put together in the 1996–1997 timeframe, to show you the changes in profile and quantities of airplanes we are buying through the QDR. Then I am going to specifically address the cost reduction initiatives that were laid in place and that we have been very actively tracking along since completion of the JET.

If you would turn to the next chart, it is entitled, “Production Cost Reduction Plan Savings.” When we concluded the JET in June 1997, we had identified approximately $9 billion, almost $10 billion worth of production cost reduction initiatives that were being laid in place. As you can see, since June 1997 to where we are today—my data shows through July 1999—that number has climbed to $16.9 billion.

Mr. Chairman, I would tell you that we have identified every project, we are tracking every project, we are folding them into our baseline as they become reality. And I think it is important to point out, if you turn back to the production cost estimate on the previous chart, I identified $15.1 billion worth of initiatives that we needed to lay in place. As you can see, I am basically tracking to $16.9 billion worth of initiatives.

If I could give you an example of what some of these cost reduction initiatives are, as we go through looking at various aspects of the program, contractors are able to, for example, in the area of materiel efficiency, by rolling the materiel up into larger quantities and using the leveraging power of the Lockheed Martin Corp., and the Boeing Corp., they roll it into much larger buys, for example, buys of materiel that would be needed to make, for example, commercial aircraft; and we are able to obviously garner much larger savings when you can go out with a much larger buy of materiel. That is just one of many, many examples.

In the engine itself, back in the June 1997 timeframe, we identified approximately $3.2 billion worth of cost reduction initiatives that Pratt was laying very aggressively into the program. Today, that number is approximately $4.1 billion. Once again, I would remind you that the offsets needed to keep this program on the engine side on track was approximately $2.5 billion, so we have obviously a lot of initiatives built in there that will ensure that we make that requirement.

I want to give you an example of one specific initiative. It is the hollow fan blade. This is something that is built by Pratt & Whitney. This is a key technology that Pratt also needs to merge into its commercial engine program as well. We laid out a plan about 3 years ago to turn the hollow fan blade into reality and actually incorporate it into this program. It is tracking to plan. The cost of a hollow fan blade has been reduced approximately threefold. When I look at the average savings per aircraft engine when we actually incorporate the hollow fan blade, it is approximately $185,000 savings per engine.

The next chart really gives you the big picture of what we are doing to manage the production costs. When we concluded the Joint Estimate Team back in the 1997 timeframe, we felt it was very important that we lay in some target price commitment curves into the development contract to really have the contractors focus in and make the right investments up-front to ensure we could deliver an airplane at $84.7 million flyaway unit cost. I would tell you for the first contract that we have written, the PRTV contract that was a firm fixed price contract, I track that very, very closely; and we expect that the original estimate we had for this program in terms of assembly hours, for example, that it is going to do better than what we had projected.

We are also tracking the same data for the production representative test vehicle two efforts, which will be six aircraft that will be put on contract later this month. We have tied this into a target price commitment curve. Basically the contractors have made up-front investments, not government investments, but up-front investments from their own corporate funds to ensure that we can stay within the target price of this program. If they are able to stay within the target price curve that we have laid out here, they not only recoup their investments, but they also make a return on their investment. This is contractually laid out within the development contract and will be carried out and executed as we move through this program.

Next, I would like to talk about avionics software for a moment. When I testified at the SASC tac air hearing on March 17, 1999, we had delivered at that time the two top blocks, Block 0 and Block 1.0 in terms of avionics software. Avionics software has always been viewed as the high-risk portion of this program. I am very pleased to report to this committee the tremendous progress that we are making in this arena. As you can see, we have already delivered down through Block 2; and the block that is colored green that says, “5 months early,” that was projected to be delivered on January 15, 2000 in fact was delivered 1 month early. It was delivered last Friday. It is today in aircraft number 4004 on the development line. We consider this to be just an extremely good news story.

If I were to show you some of the metrics, Mr. Chairman, I think you would be amazed that we track for each one of these blocks. My latest review of the metrics—and I look at them every single month—shows that for Block 2/3S and for Block 3, as well as for Block 3.1, we are on schedule and in fact are ahead of schedule, which is why we are now able to accelerate the full sensor fusion portion of the software 6½ months early, and we are now projecting to deliver that to the aircraft October 30, 2000.

I asked the Software Engineering Institute of Carnegie-Mellon University to go in and do an in-depth review of how well we are doing in the whole software arena in the avionics. I would tell you that the software institute gave us very high marks. In fact, they call what we are doing within the F–22 program as best practices, a pioneer within the Air Force, that we have outstanding tools, outstanding metrics, a very solid architecture.

The bottom line is that I believe that we will be able to meet the schedule that we have clearly laid out here. It is a schedule that has a very reasonable risk based on what we have seen to date.

I would tell you, Mr. Chairman, that with the delivery of Block 1.2 and Block 2, that represents 50 percent of the software that needs to be delivered and each of that has been delivered as we have predicted, or actually a little bit ahead of schedule.

The next chart talks about Software Quality Metrics which is a very important metric that I monitor on a monthly basis. This chart shows you the software errors found per 1,000 lines of code. It shows you what the industry standard is, and it is basically 5.5 errors per thousand lines of code. It shows you what we are actually tracking within Block 1 and Block 2. We are well below the industry standard, which is good news. I would tell you for Block 2 and Block 3S, you would see similar types of data.

Now, I would like to turn to F–22 testing for a moment. I have to take you back in history to the original development program at its inception. This program was designed to change the paradigm of how we do testing. This program has employed modelling and simulation unlike any other fighter aircraft in the history of the Defense Department. We have used a philosophy to test at the lowest subcomponent, benefit component, work it up to the subsystem and then to the system level. As you can see, this chart lists the amount of testing that we have accomplished to date. Over 45,000 hours of wind tunnel testing, over 60,000 hours of subsystems laboratory testing, over 10,000 hours of radar testing, and 14 live fire tests on aircraft components.

Today, our flight test hours in our two development aircraft are around 480 hours. Actually that number changes every day; by December 2000, we predict that we will have over 1,000 flight test hours underneath our belt.

I believe it is very important that I point out to you that we have seen much efficiency in how we do our sorties. We had planned for each of our sorties to take approximately 1.8 hours. We are actually able to achieve 2.4 hours, which represents a 25 percent increase in productivity. We have basically replanned parts of the test program to make up for time that we had lost. The climatic test chamber is a good example of where we were able to recapture much of the test time that we had originally laid out in the program.

Turning to the next chart looking at Full Scale Static testing, the primary purpose of Full Scale Static testing is to support the certification of the full F–22 operating envelope. This test is conducted in two phases. We call it the limit phase and the postlimit phase.

We have completed the limit load testing as of September 1999 successfully, and this test demonstrated that there is no permanent structural damage at the max loads level expected during the life of this aircraft. We entered the postlimit loads testing on December 2nd. This test will basically demonstrate the strength up to 1½ times the maximum load levels expected during the life of this aircraft. Today, I am at 1.2 times the max load level.

In talking to our structural engineers, we are following a very, very deliberate program, validating our analysis tools as we move to complete this test before the LRIP decision. I would also point out that almost 29 percent of our test points have been completed for the flying qualities on this aircraft.

A question we are often asked, my next chart, is, can we afford all of this? What I have laid out for you is what I call our “sand chart.” This is the average U.S. Air Force aircraft RDT&E and procurement investment over a 30-year history. As you can see, the historic norm for this history runs about 16 percent of our Air Force TOA. And if you see where we are with respect to our President’s budget, I am well below that historic norm. In fact, I am in the range of 11 to 12 percent.

In conclusion, Mr. Chairman, I would like to reiterate to you that F–22 development and production costs are very carefully managed, and I can continue to report today that they are within the congressional cost caps. This is a very tough program to manage. I think that I have the best team within the Air Force and within the contractor community aggressively working this program. Our avionics is very much on track, and all blocks are meeting or exceeding the JET delivery dates.

The F–22 has completed our planned flight test activities for this phase of the program. We had laid out approximately 480 to 500 hours, and we will complete that by the end of this month. The F–22 program, as you can see, is affordable if you look at the total obligation authority and look at what the historic norms have been.

Thank you, Mr. Chairman. I look forward to responding to your questions.

[The prepared statement of Ms. Druyun follows:]

DEPARTMENT OF THE AIR FORCE

PRESENTATION TO THE COMMITTEE ON GOVERNMENT REFORM

SUBCOMMITTEE ON NATIONAL SECURITY, VETERANS AFFAIRS AND INTERNATIONAL RELATIONS

UNITED STATES HOUSE OF REPRESENTATIVES

SUBJECT: F-22 Program

STATEMENT OF: MRS. DARLEEN A. DRUYUN
Principal Deputy Assistant Secretary of the Air Force
For Acquisition and Management

DECEMBER 7, 1999

NOT FOR PUBLICATION UNTIL RELEASED
BY THE COMMITTEE ON GOVERNMENT REFORM,
UNITED STATES HOUSE OF REPRESENTATIVES

Mr. Chairman and members of the Committee, thank you for this opportunity to appear before you to discuss the Air Force's F-22 program. To maintain its viability, our Air Force needs to be modernized as technology and the threat evolves. The Air Force's current time-phased modernization effort is rooted in the Air Force's core competencies and is an affordable balance between readiness and modernization of the aerospace force. Within our modernization efforts, the tactical aviation modernization program is based upon a high-low mix of the F-22 and Joint Strike Fighter (JSF) aircraft to provide the most combat capable, efficient, and lethal air forces possible with the resources allocated. In this mix, the F-22 provides the high capability force to attack enemy aircraft and highly defended, high value targets, while the lower cost JSF, purchased in large numbers, provides the bulk of the attack force. The current JSF design relies on the F-22 for air superiority.

Control of the vertical battlespace has been, is, and will remain a major element of United States national security policy. The F-22 will enable the United States to obtain Air Dominance--the total denial of the airspace to the enemy. Aircraft survival in the 21st century will require a combination of low observability, supercruise, integrated avionics, and high maneuverability to defeat the emerging fighter and surface-to-air missile threat. The F-22 combines all of these features into an affordable portion of the Air Force's modernization program.

We appreciate your concern, support, and funding for our efforts to modernize and sustain the world's most respected Aerospace Force.

AEROSPACE SUPERIORITY

The control over what moves through air and space provides a fundamental benefit to joint forces. DoD's *Joint Vision 2010* envisions the U.S. military dominating all aspects of a conflict—Full Spectrum Dominance. Full spectrum dominance depends on the inherent strengths of aerospace power: speed, range, flexibility, stealth, precision, lethality, global/theater situational awareness, and strategic perspective. The attainment of Air Superiority is key to the successful use of our military power. Protection of the U.S. and allied joint forces is the number one priority--their protection requires the Air Force to quickly obtain and maintain Air Superiority. Air Superiority provides the freedom from attack, the freedom to maneuver, and the freedom to attack at a time and place of our choosing. Air Superiority prevents our adversaries from interfering with operations of air, space, or surface forces. However, with newer and better ways of preventing aerospace superiority on the horizon, our forces must be modernized to maintain the edge over our adversaries. The F-22 and JSF provide the Air Force with a comprehensive and complementary modernization plan to ensure our nation's ability to control the vertical dimension well into the 21st Century.

The multi-mission F-22 Raptor is the Air Force's highest acquisition priority, and most pressing modernization need. The F-22, which will replace the aging F-15, brings an unmatched capability to the battlespace. In the hands of Air Force aviators, the F-22 will dominate the aerial arena of the 21st Century.

F-22 Program

I am pleased to provide an update on the progress of the F-22 Air Dominance Fighter program. This update will include: program schedule, flight and ground test accomplishments, improvements in air vehicle manufacturing, integrated avionics development--so central to what F-22 brings to the fight, the impacts of the Department of Defense Appropriation Act for FY2000, and finally progress in affordability initiatives for both development and production. We will also highlight program successes throughout 1999 and our current focus to meet the challenges ahead as we prepare for the Low Rate Initial Production (LRIP) Defense Acquisition Board (DAB) review in December 2000.

In May 1998, the Under Secretary of Defense for Acquisition and Technology designated the first two post-Engineering and Manufacturing Development (EMD) aircraft as Production Representative Test Vehicles (PRTVs). These aircraft will support Initial Operational Test and Evaluation (IOT&E) before joining Air Combat Command as operational test assets. This acquisition strategy balanced the risk associated with concurrent EMD and production, avoided significant program cost increases, and deferred the LRIP production decision to November 1999.

The Fiscal Year 2000 Appropriations Act directed an additional delay in the LRIP decision while allowing the procurement of additional test aircraft for Follow-on Operation Test and Evaluation. This action preserves the overall development and production schedules while retaining the program's affordability within the cost caps. At the December 2000 DAB, the F-22 team will clearly prove the technical performance of the F-22 weapon system through demonstration of critical test milestones and marked progress in meeting program affordability goals. The two overarching program goals for this year are the progression of integrated avionics testing to the F-22 weapon system level and further development and maintenance of comprehensive program cost control initiatives.

Underpinning F-22 development is the thesis that testing verifies results of previous modeling and simulation, thereby confirming system design and performance. This verification involves both flight and ground test activity. With more than ten percent of the flight testing complete, the F-22 continues to meet or exceed all performance expectations. In 1999, the aircraft achieved the following flight test criteria:

- Sustained flight above 50,000 feet
- Weapons bay open testing for both main and side weapons bays
- Supercruise (Mach 1.5+)

- Angle of attack greater than 60 degrees with engine thrust vectoring
- Significant expansion of the flight envelope

During the 1999 test program, the two flight test aircraft were inspected for aft fuselage forward boom buckling - a potential failure predicted from ongoing structural strength analysis. Inspections revealed that neither of the test aircraft had indications of distress and modifications were completed during a scheduled aircraft down time to eliminate potential failures in this area. This experience emphasizes two key aspects of the test program: First, modifications can and will be accomplished during testing without a significant impact to the achievement of flight test results; and second, the small number of these modifications demonstrate the maturity and ability of the aircraft design to meet its mission requirements--a maturity that already predicts the F-22 design will be able to fully meet its operational requirements.

To verify the attainment of all program objectives, aircraft ground testing is as important as flight test. Since the beginning of 1999, both test aircraft have been extensively engaged in ground testing. This includes dedicated logistics test and evaluation, aircraft modifications, and ground tests needed to continue to expand the flight envelope. In 1999, this included the first block of low observable maintenance that demonstrated the ability of the Air Force to organically maintain the F-22. Progress in completing the logistics test points has been outstanding. By the end of 1999, nearly one-third of the logistics test points will have been completed, providing confidence in the ability to complete all logistics tests well in advance of the first operational aircraft delivery.

In addition to aircraft ground testing, engine and aircraft subcomponent testing is also used to verify performance and durability. The amount of subcomponent testing and modeling completed easily makes the F-22 the most tested system ever developed by the Air Force (Figure 1). This includes more than 45,000 hours of wind tunnel testing, 12,000 plus hours of flight control simulation, over 10,000 hours of radar testing and, more than 4,000 hours of signature testing.

- **473 hours of F-22 Flight testing**
- **250+ Hours of Flying Test Bed Avionics Testing**
- **45,000+ Hours of Wind Tunnel Testing**
- **12,000+ Hours of Flight Control Simulation**
- **50 Hours of Aircraft LO Maintenance Demonstration During Flight Testing**
- **60,000+ Hours of Utilities & Subsystems Laboratory Testing**
- **10,000+ Hours of Radar Laboratory Testing**
- **11,000+ Hours of AIL Avionics Testing**
- **5000+ Hours of component Radar Cross Section (RCS) Testing**
- **20,000+ Tests of Composite and Metallic Materials**
- **280 Hours of Full Scale Aircraft RCS Pole Model Testing**
- **14 Live Fire Tests on Aircraft Components**

Figure 1. F-22 Testing to Date

Highlights from 1999 include demonstrating engine maturity to enable certification for engine full flight release--clearing the engine for the full aircraft flight envelope. Another highlight was the verification of the aircraft's low observable signature on a full-size aircraft model. These tests were conducted using actual flight qualified hardware on the F-22 pole model. Finally, a full-size F-22 static test article was tested to 100% of predicted flight loads in a test rig at the Lockheed Martin Georgia facility.

In summary, F-22 continues to execute a remarkably successful test program. And, we have an even more exciting program ahead next year. Four additional test aircraft will join the Edwards test force, including the first block 2 aircraft (4003) and the first avionics test aircraft (4004). By the end of 2000, the F-22 test team will demonstrated additional capabilities to include: First flight of Avionics block 3.0, Initiation of radar cross-section flight testing, high angle-of-attack testing with weapons bay doors open, and initial separation tests with AIM-9 and AIM-120 missiles.

Our number one manufacturing improvement area this past year is the wing. Difficulties with the manufacture of a key casting in the wings resulted in late deliveries of wings to final assembly. This in turn impacted the delivery schedules of EMD aircraft through aircraft number seven. Currently, the wing recovery program is a remarkable success story: a second source for castings has been qualified, machining process problems have been corrected, and wing deliveries have been on-time to the recovery schedule which supports overall EMD test objectives. The recovery schedule for wing deliveries will result in an aircraft production rate of four aircraft in 2000, a rate that will not be seen again until production ramps up in 2002. An F-22 Airframe Schedule Integration Team (ASIT) created in March 99 continues to review and assess the executability of aircraft delivery schedules to support the EMD program. Delivery of critical path assemblies (forward, mid, & aft fuselages and wings) to ASIT planning has been exceptional through October 1999.

A second aircraft production issue is the potential for the aft fuselage forward boom to buckle, which surfaced as an issue during the structural strength analysis. Analysis of the problem determined that the fix for the EMD aircraft could be incorporated on the production line with only a two-week impact to EMD delivery schedules. A Boeing Seattle team was sent to the Lockheed Martin production line in Georgia to perform the repair. The team completed their work ahead of schedule and the affected aircraft have been cleared for the full flight envelope. For the aircraft not in the production line, starting with the first PRTV Lot, a manufacturing change to the affected panels eliminates the buckling strength concern.

In summary, the aircraft manufacturing process has continued to mature in 1999 as minor problems are discovered and corrected prior to formal production. This is consistent with the objective of an EMD program to uncover such problems early and correct them prior to fielding the weapon system. Looking forward to 2000, manufacturing activity will peak with the delivery of the four flight test aircraft and the fatigue test article. Overall, the F-22 program is proceeding well through development challenges; challenges that are remarkably few for a program that seeks such revolutionary change in system performance.

Integrated avionics has been recognized as the critical technical challenge for the F-22. The combining of the inputs from on and off-board sensors into a single comprehensive display will provide the pilot with an unprecedented level of situational awareness and a key advantage in a tactical engagement. To meet this development challenge, the F-22 program plan employs a variety of ground and flight test hardware in order to incrementally achieve maturity on the integrated avionics software. While current integrated avionics program is technically challenging, the development team is currently meeting all critical avionics software and hardware delivery milestones. The current software development schedule, commonly referred to as R-20, was established in February 1999. This plan provides a logical sequence of software development from design through flight testing on the F-22. Use of the Avionics Integration Laboratory (AIL) to determine software operability is followed by checkout in the F-22 Flying Test Bed (FTB) to verify in flight performance prior to delivery to the test aircraft. The AIL is a contractor facility located at Boeing in Seattle, Washington. The AIL incorporates actual F-22 hardware in a ground test environment to determine software and hardware operability and compatibility. The FTB is a modified Boeing 757 incorporating an F-22 forward section housing an APG-77 radar and a roof mounted F-22 sensor wing. A simulated F-22 cockpit is installed in the aft cabin of the 757 in order to evaluate the software with the actual controls and displays. The aft cabin has work stations for 30 software engineers and technicians, who evaluate avionics, identify anomalies and, in some cases, even address anomalies in flight.

Block 0 software is currently flying on the flight test aircraft today. This software provides the basic flight controls for the aircraft.

Block 1 software, consisting of approximately 750K lines of code, represents approximately 45 percent of the total avionics software. Block 1 introduces radar and enhanced communications, navigation, and identification (CNI) capabilities to the test team. The initial release of block 1.1 software was made to the production line May 26, 1999--seven weeks ahead of the first "power-on" testing of aircraft 4004. An enhanced version of the block 1 software, version 1.2, will be delivered to aircraft 4004 in December 1999 in preparation for the first flight of the aircraft in May 2000.

Block 2 software, which completes the radar, CNI and EW integration, is currently testing in the FTB. Block 2 software consists of approximately 1.4 M lines of code representing approximately 70 percent of the total avionics software effort.

In order to gain early insight into the performance of the aircraft sensors, an additional software block was added in the R-19 schedule. This block, identified as block 3S, is currently in testing at the AIL and initiates the sensor fusion and sensor tasking key to the F-22 performance. Our current projections show no slip to the blocks 2 and 3S schedules.

The Block 3.0 software, currently in software coding, will provide the full sensor fusion and weapons integration for the F-22. This software block will consist of 1.8 M lines of code. Congressional direction prevents the awarding of an LRIP contract prior to first flight of the Block 3.0 software in an F-22. First flight of this software is currently scheduled for October 30, 2000.

Again, avionics remains our key technological challenge area. The team has done a magnificent job in supporting critical FTB and aircraft need dates and maintaining critical program milestones. Continued diligent use of the phased software development approach will provide an unmatched level of software maturity at first flight while optimizing both cost and schedule for avionics development. Team performance over the past year clearly demonstrates that it is taking the necessary actions to protect critical avionics need dates in the development program and ensuring avionics testing proceeds on schedule.

The FY00 Appropriations Act (Public Law 106-79) provided full funding of $1.2B for F-22 EMD in FY00. As part of an Appropriations Committee compromise, the procurement funding request was reduced by $1.85B and an additional $1.3B was added to the F-22 RDT&E account for the acquisition of up to 6 additional test aircraft (PRTV II), advanced procurement of 10 Lot I production aircraft and for termination liability. This funding may not be used for acquisition of more than 17 flight-capable test vehicles of which 11 are already on contract. Of the funds provided, a maximum of $277.1M may be used for advanced procurement of 10 F-22 aircraft following Secretary of Defense certification that all of the 1999 DAB program criteria have been satisfied. In addition, $300M of the $1.3B is set aside for termination liability. This $300M can be used for other program requirements, after 1 October 2000, if the program is not terminated.

The FY00 Appropriations Act prohibits awarding an LRIP contract until first flight of an F-22 aircraft with Block 3.0 software has been conducted, the Secretary of Defense certifies to Congressional defense committees that exit criteria for LRIP have been completed, and DOT&E submits a report assessing the adequacy of testing to measure and predict the performance of the F-22's avionics systems, stealth characteristics, and its weapons delivery systems.

The impacts of the FY00 Appropriation Act will have a minimal impact on the current F-22 cost and schedule (Figure 2). Since the Act provides $1.3B in RDT&E funding for the next 6 aircraft, these aircraft will be purchased using an incremental approach. An existing contract option for these six aircraft and advanced buy for 10 aircraft in the first production lot will be exercised as planned following completion of the 1999 exit criteria and a DAE review in December 1999. Additional funding of $404M in FY01 and $148M in FY02 will be required to complete the 6 aircraft "PRTV II" buy - this will make up the difference in the $1.85B requested in FY00 and the $1.3B appropriated. The additional funding required in FY01 is contingent on the $300M being available for "other program requirements if the program is not terminated." A Low Rate Initial Production decision for Lot 1 (10 aircraft) is planned for December 2000 following completion of the CY2000 criteria and Appropriations language requirements.

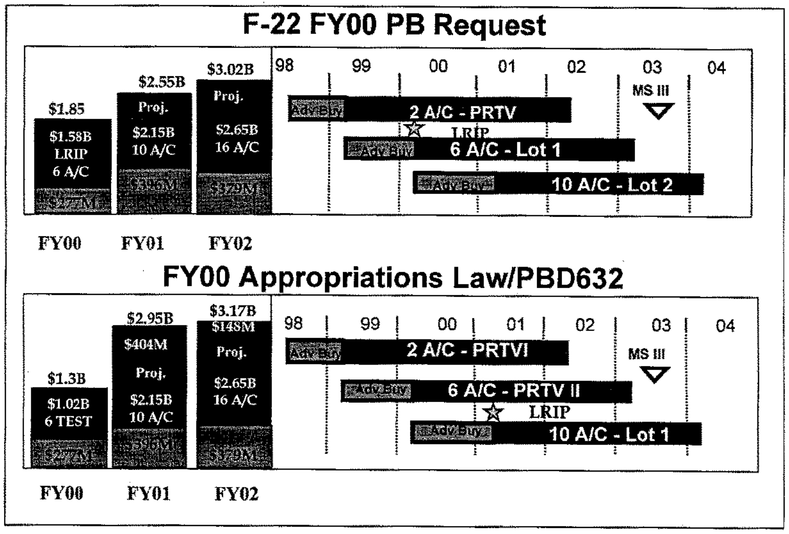


Figure 2. Impacts of the FY00 Appropriations Act

Cost control is a critical focus with the F-22 team. The Air Force and F-22 contractors are committed to deliver the F-22 within the Congressionally-mandated cost caps. The Air Force and contractor team initiated cost reduction programs in both the development and production phases of the program in 1997 at the conclusion of the Joint Estimating Team (JET). These efforts have achieved cost reductions, which is key to keeping the development and production costs within the cost caps.

In the March 1999 Government Accounting Office (GAO) report entitled, "F-22 Aircraft—Issues in Achieving Engineering and Manufacturing Development Goals," the GAO reported $667M in projected EMD cost growth. This number was developed by the F-22 team and represented the F-22 program office and contractor estimate of future program cost risks. The challenge for the team was to deliver essential combat capability within the EMD cost cap. In December 1998 the Undersecretary of Defense for Acquisition and Technology approved an Air Force plan to accommodate the projected future development risks within the EMD cost cap. That plan involved a combination of development cost reduction initiatives, scrubbing development costs, application of existing management reserves, and deferral on non-essential combat capability.

Since the approval of these initiatives, the Air Force program office and the contractor team have continued to closely monitor the progress on both the realization of the cost risks and the achievement of the cost savings. As of October 1999, $238M of the cost risks had been realized. Despite this realization of cost risk, the Air Force Cost Analysis Improvement Group (AFCAIG) determined that the EMD program could be completed within the cost cap.

Key to this positive evaluation has been the better-than-expected achievement of cost savings. Table 1 shows that the program has achieved greater than 110 percent of the savings expected and is continuing to explore additional cost savings to offset any future unknown risks.

Management Actions	Proposed Savings March 99	Actual Savings to Date
Contractor Mgm't Reserve	$0.18B	$0.18B
External Stores Deferral	$0.14B	$0.14B
Test Infrastructure	$0.11B	$0.11B
Lab Infrastructure	$0.10B	$0.10B
Gov't Cost Reductions	$0.05B	$0.05B
Dev Cost Reduction Programs	$0.08B	$0.15B
Gov't Mgn't Reserve		$0.13B
Total Offsets	$0.66B	$0.86B

Table 1. F-22 EMD program cost reduction status

The EMD cost savings demonstrate the creative things the program can do to reduce costs. We continue to push these initiatives because they represent cost savings in the remaining development program. In summary, the F-22 team is continuing to pursing a wide range of options to achieve the cost savings necessary to deliver the full combat capability within the EMD cost cap.

Likewise, the AFCAIG estimated that the F-22 production program could be completed within the Congressionally-imposed cost cap ($39.7B in Then Year Dollars (TY$)) by continuously pursuing production cost reductions as part of a series of initiatives referred to as Production Cost Reduction Plans (PCRPs). The Air Force reviews the PCRP program every month. Our methodology is quite simple: review the plans to confirm the required investments have been made, that scheduled milestones have been met, and the basis of estimate remains valid. The PCRP status is shown in Figure 3. We do have examples in areas that exceed initial savings forecasts as well as examples of a few initiatives being discontinued in favor of projects offering even greater savings potential. Early results indicate the production cost reduction initiatives are performing according to plan and over half of these initiatives have been incorporated into the baseline cost estimate.

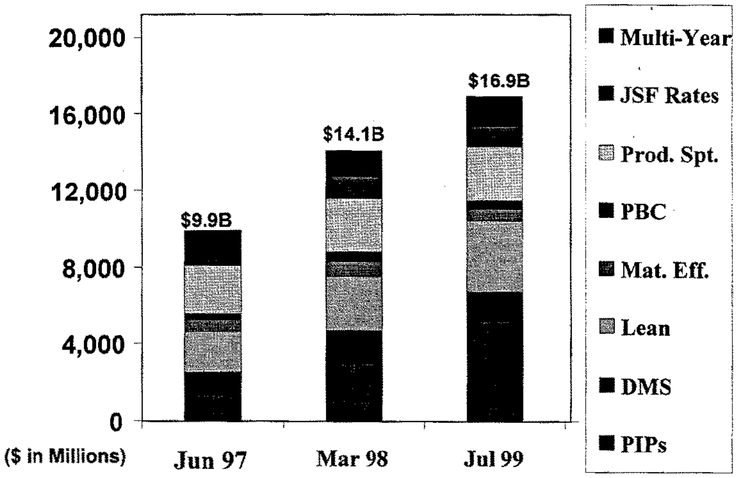


Figure 3. Production Cost Reduction Plan Status

Examples of ongoing PCRPs include:

- A Lockheed initiative to consolidate parts procurement through a central procurement activity in Fort Worth, Texas. The original plan called for procurement of 2000 parts with estimated savings of $177K per aircraft. To date, 987 parts out of the total of 2000 have been procured and the documented savings are $136K per aircraft. If we achieve similar results in the remaining 1000 parts, actual savings could be substantially higher than the initial projections.
- Converting the current two-unit system of Sanders and Kaiser heads down display devices to a single Kaiser device. The consolidation reduces the procurement costs by an average $580K per aircraft based on existing procurement quotes.

The F-22 has a dynamic production program and we do terminate or redirect efforts if they fail to yield sufficient savings or the business case otherwise fails to develop. One such example was a planned producibility improvement investment of $800K for a second source redesign of an electric fuel pump. The possibility of competition provided the incentive for the original supplier to reduce the production quote by $25M. This enabled the program to invest the $800K in other opportunities.

In the end, the important performance measure is the final negotiated contract price. In this case, we have very encouraging results from the PRTV I and II contracts for aircraft and engines. In each case, we met the goals established for contract prices and agreed to firm fixed price contracts for these procurements. That relates directly to the contractor's confidence to deliver a product that meets the Air Force and DoD affordability objectives.

Other measurement criteria are also in place to assess progress in meeting affordability objectives. One is a target price curve (TPC) to measure the recurring cost to build aircraft and engines. The TPC established a mechanism to measure cost savings and allow payment for contractor cost savings investments and a return on their investment to ensure an affordable production program. The TPC provides a $113M incentive to the contractor to reduce the average cost per unit during LRIP (applies to Lot 1 through Lot 3) and establishes the starting point for affordable multi-year procurement (Lots 4-8 and 9-12).

I conduct a monthly execution review to examine cost, performance, and schedule, and the Undersecretary of Defense for Acquisition and Technology holds a quarterly review as we proceed to the LRIP DAB in December 2000. In addition, all our information is available for oversight by the GAO and all responsible oversight agencies.

Looking at the entire program, our primary focus this summer is to demonstrate producibility by delivering to schedule and affordability by ensuring development costs remain within the EMD caps. We do not want to discount the effort required to meet the challenges ahead, and we assure this committee that every member of the F-22 team knows the yardstick for the year and remains committed to a successful LRIP DAB in December 2000.

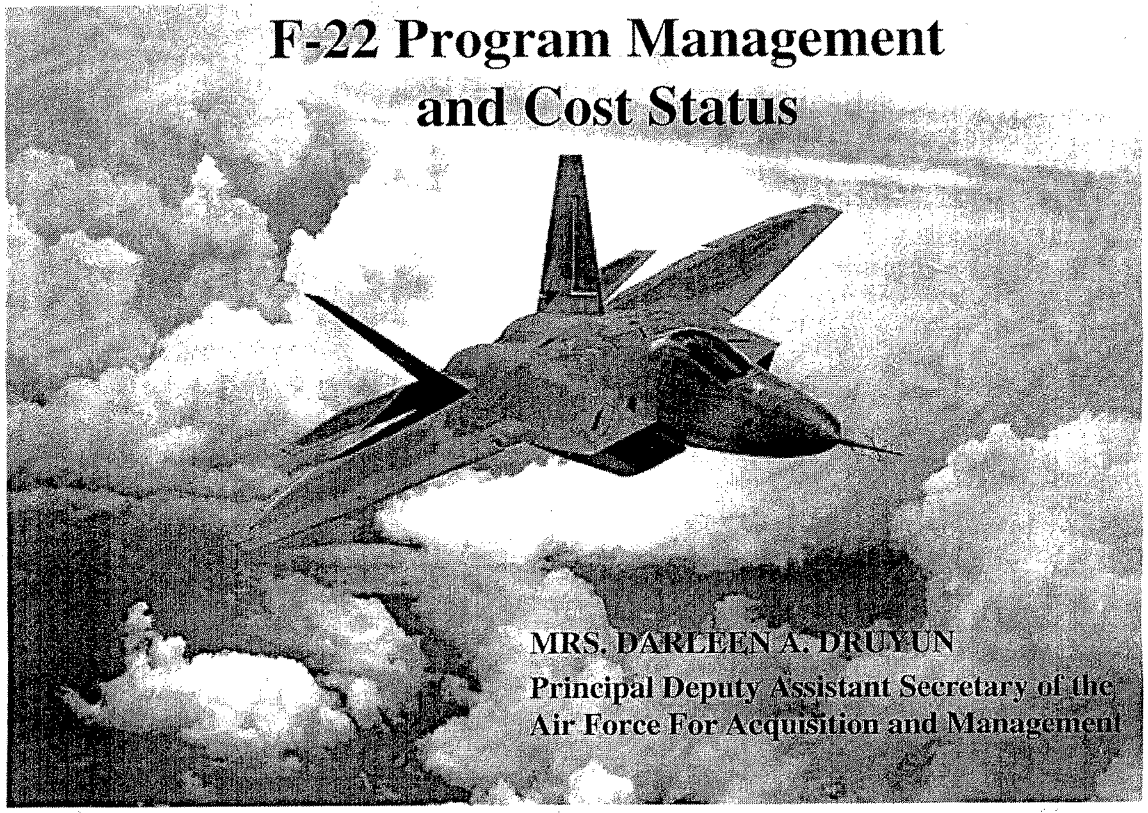
Not everyone has agreed the F-22 team can meet the technical, cost, and schedule challenges ahead. However in 1999, the team had a clear yardstick by which to measure its performance and once again met the challenge. Next year we take head-on the challenge of avionics development, demonstrated producibility, and continuing cost control. The F-22 team is committed and working hard to again succeed in meeting the challenge.

THE NET RESULT

The F-22 program is on track to meeting all performance parameters within the cost caps. The program continues to meet or exceed all critical user requirements. Senior Air Force and industry leaders are confident the F-22 program will meet its production cost target and remain within its cost cap, provided program funding remains stable. The warfighter will receive the F-22's revolutionary capabilities on-time at an affordable cost, thus ensuring air dominance in future conflicts.

The American people expect the Air Force to dominate the sky. This is based in large part to the reality that no American service soldier has been killed by an enemy aircraft in over 40 years. As long as the United States is able to dominate its enemies, the United States can achieve its objectives with minimal casualties. While some have said that the cost of current fighter modernization programs is too high, the cost of not having air dominance is unaffordable. In order for the United States to maintain aerospace superiority in the next century we must field the F-22 and JSF.

The Air Force's tactical aviation modernization program is only a part of our overall efforts to build the world's most respected Aerospace Force. We are enhancing our expeditionary capabilities by balancing investments across our core competencies. Our focus is improving the Air Force's ability to project power rapidly, precisely, and globally. The Air Force's unique aerospace superiority, global attack, and precision engagement capability, supported by information superiority, rapid global mobility, and agile combat support, will produce a force capable of delivering decisive combat power whenever and wherever needed. The F-22's true value must be measured in American lives saved through dominance of the skies in future combat and also by conflicts prevented because other nations understand and fear our unmatched combat power.



F-22 Program Management and Cost Status

MRS. DARLEEN A. DRUYUN
Principal Deputy Assistant Secretary of the
Air Force For Acquisition and Management

Outline

- Why We Need the F-22
- EMD Costs
- Production Costs
- Avionics Status
- Testing Status
- Affordability
- Summary

Why do we need the F-22?

The need for the F-22 is driven by both the air superiority force structure required to realize JV 2010, and the total threat picture that must be overcome to achieve that state

- The total threat to American air dominance includes advanced surface-to-air missiles, fighter aircraft, and air-to-air missiles
  - F-15 is unable to operate in an advanced SAM environment
  - F-15 is at rough parity today with the Su-27 and MiG-29
  - F-22's attributes of stealth, supercruise, maneuverability, and integrated avionics are essential for enabling air dominance

Why do we need both the F-22 and JSF?

The F-22/JSF high/low force mix balances affordability and capability and is the most cost effective solution for Air Force fighter modernization

- F-22 is the force enabler--developed as the next generation Air Superiority fighter
  - Provides Air Dominance over future battlefields
  - Optimized for air-to-air environment & penetrating the most advanced "keep out" surface-to-air missile threats
  - Enables other forces & systems like JSF to effectively execute their missions
- The JSF is the force--developed as a relatively low cost multi-role fighter optimized for ground attack
  - Provides Precision Engagement and Global Attack capability
  - Optimized for all weather, precision air-to-ground employment of tactical weapons
  - JSF will rely on the F-22 to provide Air Superiority

Current EMD Cost Estimate

• Airframe	$14.362B
• Engine	2.396
• Other Gov't Costs/ECPs	2.142
• Total	$18.9B

EMD Airframe Contract Cost Track

($ in Millions)

Original Contract Value **$10,354**

Changes	Total	Rephase	Growth	Other
Rephase 1 ('93)	969	549	425	(5)
2 A/C Reduction '93	(221)			(221)
Rephase 2 ('94)	544	544		
Rephase 3 ('96)	784	453	332	(1)
Work Scope Changes	855			855
Unawarded Award Fee	(103)			(103)
Subtotal Contract Changes	**2,828**	**1,546**	**757**	**525**
JET Adjustment	1,180		1,180	
Total Changes	**4,008**	**1,546**	**1,937**	**525**
% Change	**38.7%**	**14.9%**	**18.7%**	**5.1%**

Total Current Value **$14,362**

EMD Engine Contract Growth

($ in Millions)

Original Contract Value **$1,490**

Changes	**Total**	**Rephase**	**Growth**	**Other**
Rephase 1 ('93)	191	185	6	
6 Engine Reduction '93	(39)			(39)
Rephase 2 ('94)	291	73	218	
Rephase 3 ('96)	206	87	119	
Work Scope Changes	126			126
Unawarded Award Fee	(13)			(13)
Subtotal Contract Changes	**762**	**345**	**343**	**74**
JET Adjustment	144		144	
Total Changes	**906**	**345**	**487**	**74**
% Change	**60.8**	**23.1**	**32.7**	**5.0**

Total Current Value **$2,396**

F-22 EMD Costs

Worst Case Shortfall $0.66B - March 99

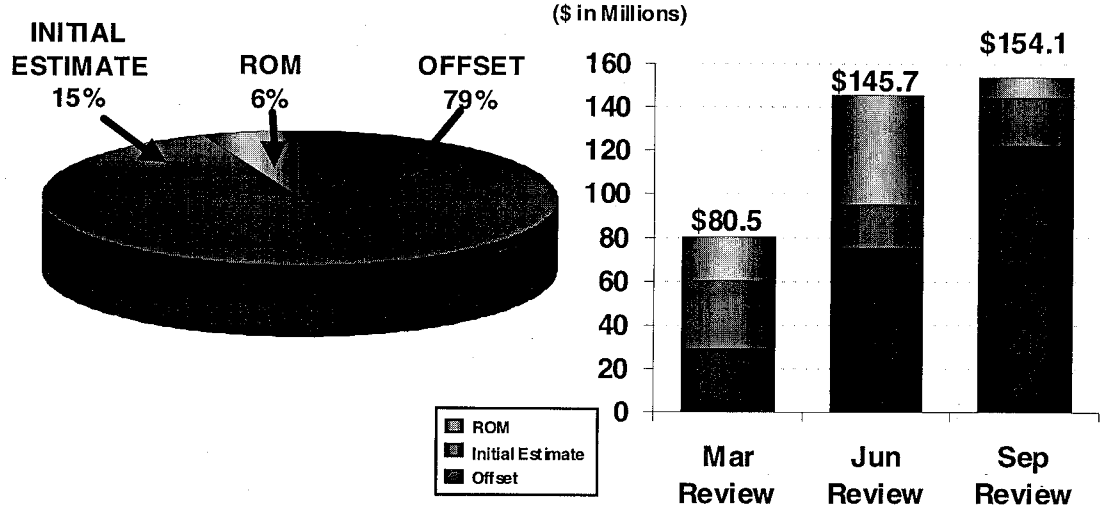
Management Actions	Proposed Savings March 99	Actual Savings to Date
Contractor Mgm't Reserve	$0.18B	$0.18B
External Stores Deferral	$0.14B	$0.14B
Test Infrastructure	$0.11B	$0.11B
Lab Infrastructure	$0.10B	$0.10B
Gov't Cost Reductions	$0.05B	$0.05B
Dev Cost Reduction Programs	$0.08B	$0.15B
Government Mgm't Reserve		$0.13B
Total Offsets	$0.66B	$0.86B

Better than expected cost reduction program results will be used to offset future cost risks

Development Cost Reduction Status

Cost Reduction Distribution

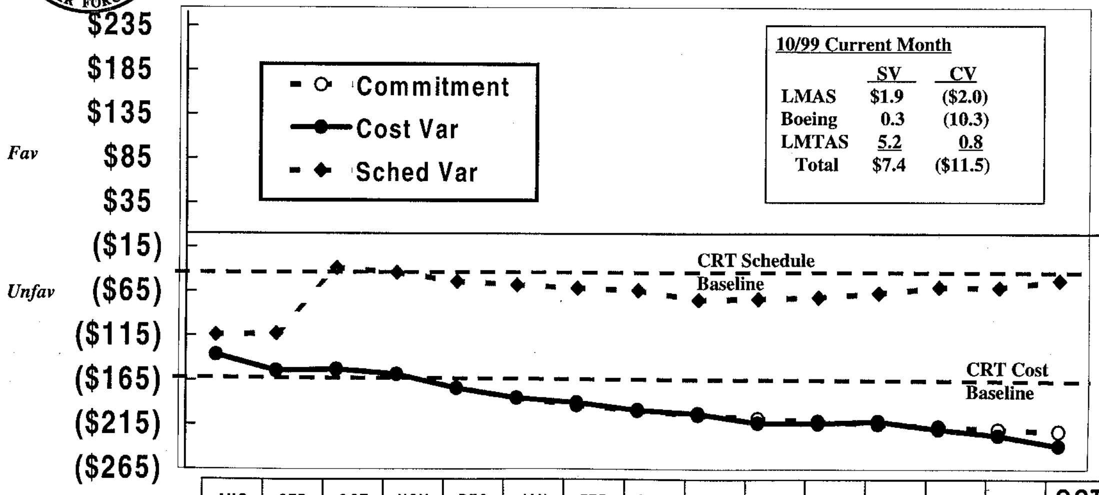
Cost Reduction Trends



- ROM - Projection of Savings Based on Initial Review
- Initial Estimate - Project Coordinated With IPT But Not Committed
- Offset - IPT / Program / CCT Approved & Committed

Ongoing Commitment to Pursue Additional DCRP Initiatives

Air Vehicle October 1999 Final CPR



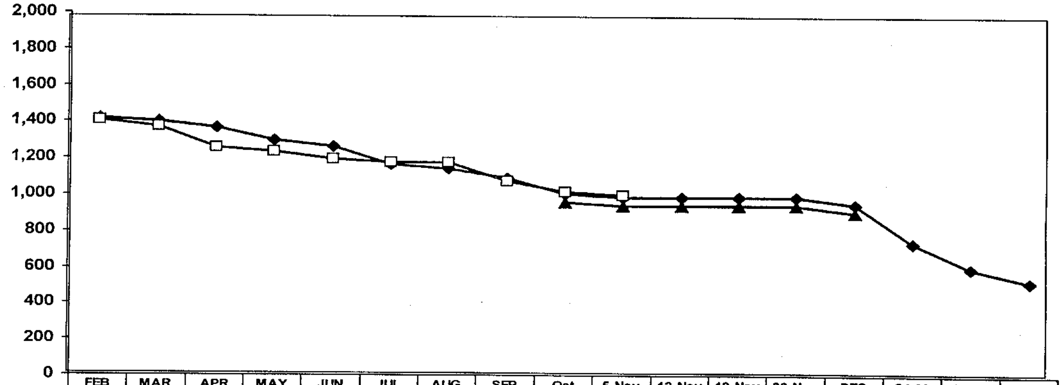
10/99 Current Month

	SV	CV
LMAS	$1.9	($2.0)
Boeing	0.3	(10.3)
LMTAS	5.2	0.8
Total	$7.4	($11.5)

	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
Commitment	(136)	(155)	(153)	(159)	(174)	(185)	(193)	(199)	(204)	(208)	(211)	(214)	(217)	(220)	(222)
Cost Var	(136)	(155)	(153)	(159)	(174)	(185)	(191)	(198)	(203)	(213)	(214)	(211)	(220)	(227)	(238)
Sched Var	(114)	(113)	(39)	(44)	(54)	(58)	(63)	(64)	(75)	(74)	(72)	(67)	(61)	(60)	(53)

EMD Equivalent Headcount

Lockheed Martin Fort Worth



	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	Oct	5-Nov	12-Nov	19-Nov	26-Nov	DEC	Q1 00	Q2 00	Q3 00
Overtime	8%	8%	6%	6%	6%	7%	8%	5%	5%	5%							
◆ Budget	1,418	1,405	1,366	1,298	1,267	1,169	1,142	1,091	1,008	986	986	986	986	946	737	596	523
□ Actuals	1,406	1,376	1,256	1,234	1,193	1,176	1,181	1,072	1,018	1,002							
▲ Projection									957	942	942	942	942	902			

As of November 5, 1999

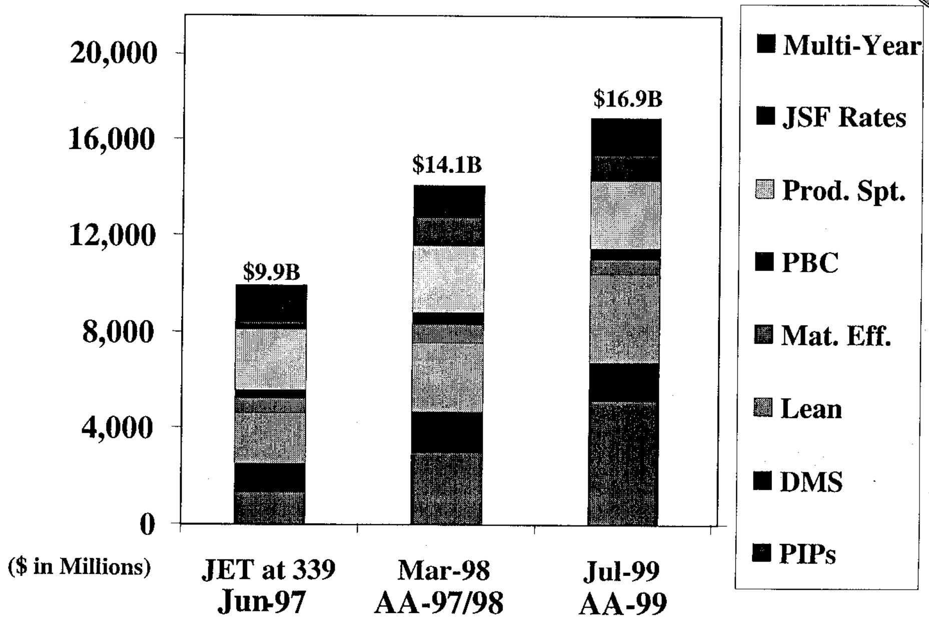
FY00 Production Cost Estimate

Lockheed Martin	
Original JET Est.	$49.5B
QDR	(2.4)
PCRPs	(15.1)
	$32.0B

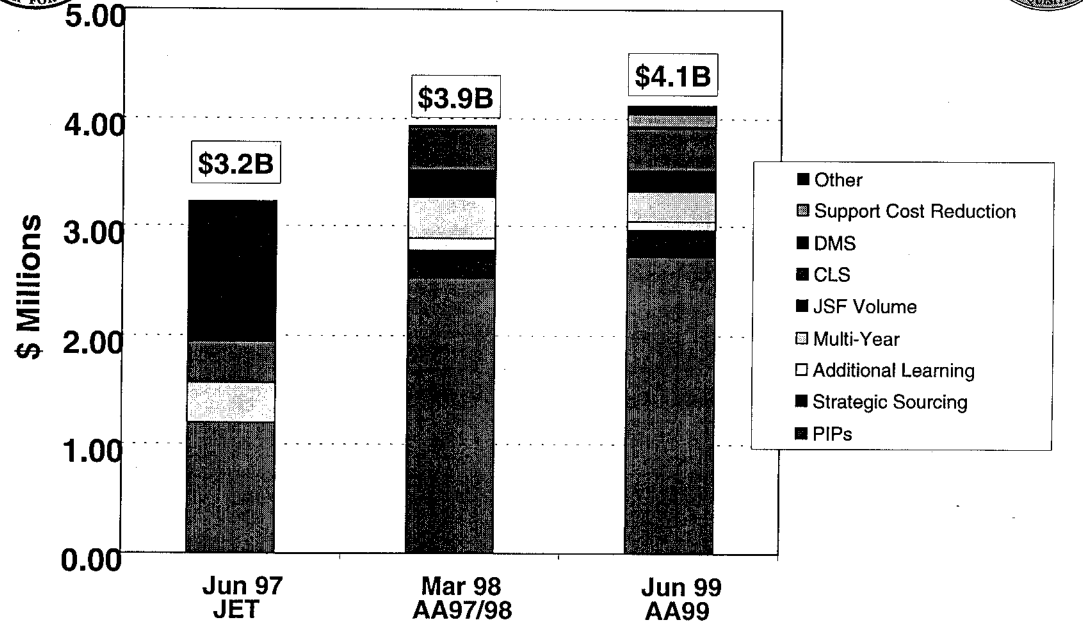
Pratt & Whitney	
Original JET Est.	$10.9B
QDR	(1.3)
PCRPs	(2.5)
	$ 7.10B

Subtotal	$39.1B
Other Gov't Costs	0.7
Cost Cap and Production Program Estimate	$39.8B

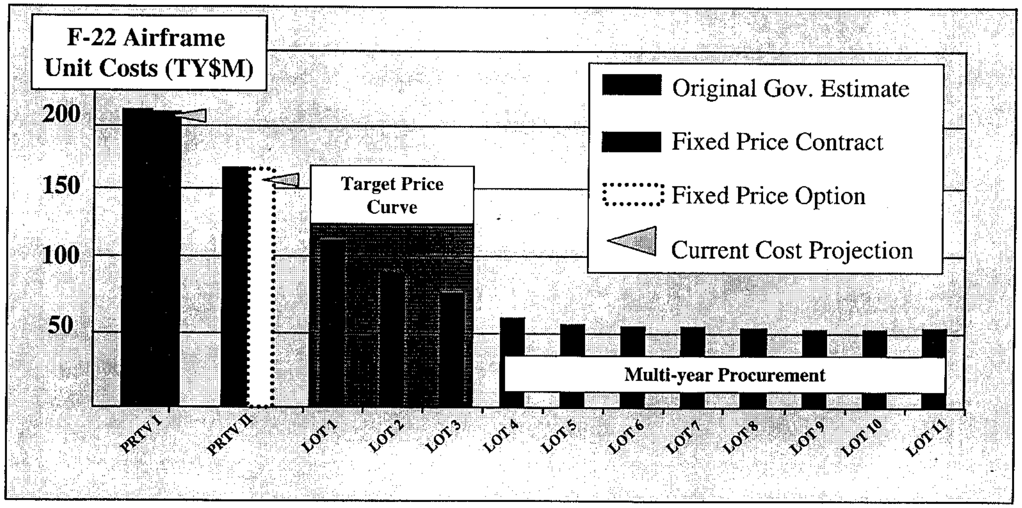
F-22 Production Cost Reduction Plan (PCRP) Savings



F119 PCRP Savings



F-22 Production Costs



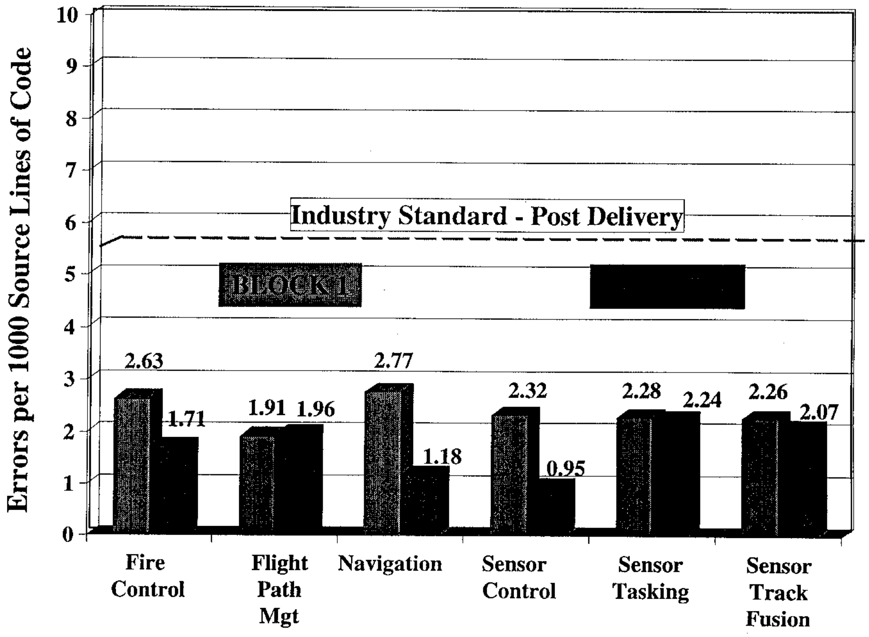
Results in a $84.7M Flyaway Cost

Avionics Software Delivery Dates

BLOCK	R-19 OFP Schedule	R-20 OFP Schedule	Current Need Dates	Margin	Comments
Block 0 - Flying in 2 test birds • U&S / VMS				Delivered	**Performing as Expected**
Block 1.0 - In flying test bed · CIP/Radar/Mission Avionics Software				Delivered	**Delivered 2 Weeks Early**
Block 1.1 - 750K LOC (45%) First air vehicle load for 4004: · Flight Control System · Vehicle Mgt System	**5/28/99**	**5/28/99**		Delivered	**Delivered 5/26 2 Days Early**
Block 1.2 · Updates to FCS and VMS	**1/15/00**	**1/15/00**	**5/3/00**	5 months Early	**Early Delivery Predicted**
Block 2 - 1.4M LOC (70%) Flying test bed only · Radar/CNI/EW Integration · Initial Sensor Fusion · Full Weapons Integration	**1 Aug 99**	**Increment 1 31 Aug 99 Increment 2 22 Oct 99**		Delivered Delivered	**Incr 1: Delivered 8/26 1 Week Early Incr 2: Delivered 10/21 1 Day Early**
Block 2/3S · "Sensor Physics"	**4/10/00**	**4/10/00**	**4/10/00**		**On Schedule**
Block 3.0 · Full Sensor Fusion	**11/20/00**	**12/4/00**	**01/01/01**	2 months Early	**Accelerating to Deliver 10/30/00**
Block 3.1 - 1.9 M LOC (100%) · JDAM/JTIDS	**5/4/01**	**6/19/01**	**6/19/01**		**On Schedule**

Software Quality Metrics

Software Errors Found per 1000 Lines of Code
Block 1 & 2 Mission Software



F-22 Testing to Date

- 473 hours of F-22 Flight testing
- 250+ Hours of Flying Test Bed Avionics Testing
- 45,000+ Hours of Wind Tunnel Testing
- 12,000+ Hours of Flight Control Simulation
- 60,000+ Hours of Utilities & Subsystems Laboratory Testing
- 50 Hours of Aircraft LO Maintenance Demonstration During Flight Testing

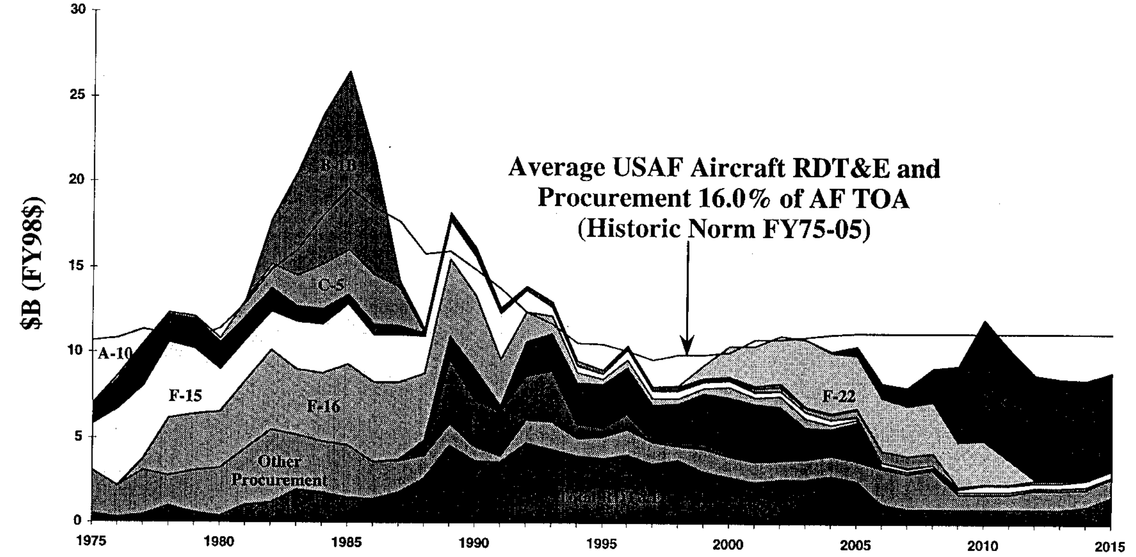
- 10,000+ Hours of Radar Laboratory Testing
- 11,000+ Hours of AIL Avionics Testing
- 5,000+ Hours of Component RCS Testing
- 20,000+ Tests of Composite and Metallic Materials
- 280 Hours of RCS Full Scale Pole Model Testing
- 14 Live Fire Tests on Aircraft Components

As of 1 Dec 99

F-22 Test Program

- Full Scale Static testing
  - Completed limit load testing on critical structure in Sep 99
  - Post limit load testing commenced Dec 99, scheduled to complete prior to LRIP decision
- 28.5% of Test points completed for flying qualities

USAF Aircraft Investment Strategy



Average USAF Aircraft RDT&E and Procurement 16.0% of AF TOA (Historic Norm FY75-05)

Data Reflects FY00 PB

Summary

- F-22 EMD and Production costs are carefully managed and are within Congressional Cost Caps
- Avionics are on track and all blocks are meeting or exceeding JET delivery dates
- The F-22 has completed all planned flight test activities for this phase of the program
- The F-22 program is affordable

Mr. SHAYS. Thank you very much for your comprehensive testimony. I am going to start the questions by just making a quick statement, but first I want to recognize that we have not only Mr. Saxby Chambliss who is going to participate in the hearing—he doesn't serve on this committee, but he serves on the Armed Services Committee; we welcome him and are happy to have him here. We also have John Mica who serves on the Government Reform Committee, serves on this committee and also is the chairman of the Government Reform Subcommittee on Criminal Justice, Drug Policy, and Human Resources.

I would also point out that Mr. Chambliss is the leadership's representative on the Budget Committee. I take a general assumption that our job in Congress is to make sure that our military are never involved in a fair fight—in other words, we always have superior equipment—that in every instance the training is better, so that when we ask our men and women to risk their lives, they in fact have all the advantages possible.

I have less concern about the concept of the F–22 than the general recognition that because we need it and the manufacturing—and the Air Force knows we need it—there isn't the competition that says, well, someone else is going to replace us. It's really the only show in town; at least that is the way it strikes me.

I would also say that I have always appreciated the Air Force's cooperation with this committee and DOD in general. We have a good relationship. But this is a program, since there isn't the competition, that Congress needs to do a better job of oversight and put people's feet to the fire.

I would ask you, Mr. Schneiter, first, that—you gave a whole host—your presentation was solely based on the various groups that were involved in helping to control costs. I was struck by the fact that there were so many, and I began to wonder who ultimately holds the accountability and I began to wonder what kind of coordination exists between—among these various groups. Maybe you could respond to that.

Mr. SCHNEITER. Certainly.

The accountability for the acquisition programs rests with the Under Secretary of Defense for Acquisition, Technology and Logistics, Dr. Gansler. He participates in all of those activities that I mentioned with the exception of the Joint Requirements Oversight Council, which is the purview of the military and the Joint Staff. Many of the same participants are in all of those activities, but the activities do different things. The Defense Acquisition Board process deals with milestones: Is a program ready to go into Engineering and Manufacturing Development, is it ready for production? So typically the Defense Acquisition Board will meet every few years or so on a program.

The process that I described after that involves many of the same people, but it is a more routine process that occurs every 3 months. Whether or not a program is about to come to a milestone, we examine how well it is doing.

Then the third thing I described in that nature is the annual budget process. Again, Dr. Gansler very much participates in that process. Ultimately the Secretary and the Deputy Secretary are the decisionmakers with regard to that.

Mr. SHAYS. Ms. Druyun, why were EMD aircraft flight dates delayed again due to wing manufacturing problems in June 1999, 3 months after DOD testified that the problems had been solved?

Ms. DRUYUN. If you were to look, sir, at the approved DAB schedule that we had in terms of the performance of this program—and the baseline that we are following is the baseline that was set out in December 1998—we have been meeting all of the revised wing delivery schedules. They have been delivered on time since we were able to basically solve that problem. They are all coming in on time with the exception of, I believe it is the last one.

This is an issue where Boeing overdrilled some holes, and so there are going to have to be some repairs done to those holes that they overdrilled.

But the fact remains, our data will show you, that we are tracking to the revised delivery schedule for both—for all of the wings.

Mr. SHAYS. So your point is that there is not a problem with the——

Ms. DRUYUN. My point, sir, is there was a problem. This problem was worked very aggressively and this problem has been solved. We are tracking it on a monthly basis to ensure that those wings are delivered to the schedule that we have in place today, and they in fact are being delivered to that schedule in place today. That was a problem that we had approximately 2 years ago. As I said, a problem very aggressively worked.

Mr. SHAYS. Let me interrupt you a second. There are so many revisions or there appear to be so many revisions, I am wondering which revision am I at?

Ms. DRUYUN. It is the current baseline of the program.

Mr. SHAYS. Let me stop you for a second. In June, we were told that the problems had been solved. Were the problems solved when we were told they were solved or were there new problems that existed afterwards?

Ms. DRUYUN. The schedule that I am referring to is the approved baseline schedule.

Mr. SHAYS. Dated when?

Ms. DRUYUN. This is 1998.

Mr. SHAYS. When?

Ms. DRUYUN. When in 1998? I would have to get that for the record, sir.

I would say sometime in mid-1998, but I will officially supply that for the record.

The problems that we had with the wing itself were solved. We actually—we have had to do a titanium casting, for example.

Mr. SHAYS. Let me just be clear, though. Is the information that I have that—in June we were told the problem was solved, and then are you saying you kept on the schedule of the 1998 schedule, or did we have a new schedule that occurred after that?

Ms. DRUYUN. Master Schedule 24 is what I have been basically referring to. We laid in a plan for late wing delivery, as well as a plan for boom repair, and we are basically tracking to that plan in terms of wing deliveries.

I think there has been a lot of confusion in this subject, sir. We had a problem with our ability to manufacture these wings. It was a problem that was very aggressively worked. Once they were able to demonstrate that they had a fix laid in place, we have since tracked them to ensure that those wings are being delivered on time.

It is a very dynamic program. It is a living, breathing program. As you encounter problems, you work them and then you lay in a schedule to track them to it.

Mr. SHAYS. I don't have any question that it is extraordinarily dynamic. I want us to make sure that when we are hearing that we are on schedule, we know which schedule we're on and when the schedule has been revised and how many times we have revised the schedule so that we have actually ended up meeting it.

Let me just ask another question as it relates to this. If you are being forced to delay flight tests and aircraft production, why are long-range goals also not being pushed back?

Ms. DRUYUN. I'm not sure I follow your question, sir.

Mr. SHAYS. Particularly as it relates to avionics. I mean, we have a tremendous delay there. And so you have revised your schedule in the short run, but we are being told we're going to meet all the scheduled production in the future. It would seem to me, if you revise in the beginning, everything has to be revised. You seem to be pushing everything up, it seems to me, and into an unrealistic limited time.

Ms. DRUYUN. If you look at where we are in terms of the build of the aircraft themselves, aircraft 4003, this has been a schedule that I have been tracking since March 1999 very, very carefully. Aircraft 4003 is scheduled to be delivered February 16, 2000; 4004 is scheduled to be delivered May 2000. Aircrafts 4005 and 4006 were scheduled to be delivered in late June 2000 and August 2000, and there I am tracking, and this——

Mr. SHAYS. This is your revised schedule, not the master schedule?

Ms. DRUYUN. This is the master schedule. It has been in effect since March 1999. That is the schedule that I am tracking to.

Mr. SHAYS. So it was revised when?

Ms. DRUYUN. Our schedule, sir, is adjusted on an annual basis to accommodate where we are in the program. For example, as we have received earlier delivery of some of the avionics——

Mr. SHAYS. My time is running out. We're going to have plenty of time to talk about this, but let me just ask you, the avionics is behind schedule by how much?

Ms. DRUYUN. The avionics, to the schedule that we are tracking, it is not behind schedule, it is actually meeting or ahead of schedule.

Mr. SHAYS. Based on which revision?

Ms. DRUYUN. That is an excellent question, sir. If I took you back to the Joint Estimation Team back in the 1997 timeframe, when I look at where I am with Block 2 and Block 3, I am going to deliver ahead of the 1997 schedule. In fact, that one chart that I showed you in my presentation to you shows that we have been able to draw in that schedule because we have such outstanding tools and personnel working on the program that we are actually able to finish the coding and the integration and the sensor fusion sooner than we thought. That was really a good news story.

I can understand your confusion, because I had had the same confusion.

Mr. SHAYS. There is going to be a lot of confusion, but we have lots of time to sort it out. There are going to be good stories here and there are going to be bad stories. It is helpful for you not to just want to make me hear the good stories, because eventually the bad stories come out. It is better to have it all come out now, and we know, this is the first of a few hearings that this committee will have.

We just want the broad picture. But my sense is that we have not gotten—we are behind in our testing and that is pushing—it would strike me that it would push back other elements to your whole program.

Let me call on Mr. Tierney, and I will come back.

Mr. TIERNEY. Thank you, Mr. Chairman.

Given the fact that Congress removed about $500 million from the fiscal year 2000 budget request, which was originally about $3 billion, can you tell us whether or not the Air Force intends to make up that shortfall in some way?

Ms. DRUYUN. What Congress did in the fiscal year 2000 budget that was passed and signed into law was to require us to incrementally fund the PRTV 2 aircraft buy of six aircraft. In terms of incrementally funding it, we are laying into our budget today, and obviously our budget is not complete within the Department, but we are laying in the funds for fiscal year 2001 and fiscal year 2002 to finish incrementally funding those six aircraft.

Mr. TIERNEY. Do I interpret it correctly to say you're increasing your funding request over the next 2 years?

Ms. DRUYUN. Yes, and you should see that hopefully in the budget submission when it comes over the end of January, the first part of February.

Mr. TIERNEY. There was some suggestion in yesterday's edition of the Defense News that the Air Force is leaning toward delaying the purchase of C–130J transports to make up the shortfall.

Are you considering that option?

Ms. DRUYUN. Sir, that is an issue that is very much under review today within our budget. There have not been any final decisions made. I do not expect any final decisions on that will be made until the budget is closed out.

Mr. TIERNEY. What other program sources are you considering to make up that shortfall?

Ms. DRUYUN. The C–130J was never—was not really laid in this soon in our budget, so we're not taking from the C–130J to pay for the F–22.

Mr. TIERNEY. And nowhere do you project that you are going to consider doing that at all?

Ms. DRUYUN. To use the C–130J which was not in the 2001 budget we sent over last year to pay for the F–22?

Mr. TIERNEY. To delay the purchase of the C–130Js.

Ms. DRUYUN. That is a subject that is very much under review today.

Mr. TIERNEY. So you are considering delaying the C–130Js?

Ms. DRUYUN. If you had looked at the budget that we submitted last year, I believe we really did not start buying those aircraft, I believe, until around the year 2003. But that is all under deliberation and will be vetted through the budget process and will conclude by the end of December.

Mr. TIERNEY. I think GAO estimated that if the C–130J purchases ceased, overhead costs for the F–22 that Lockheed Martin also makes at their facility would increase as much as $150 to $160 million per year; is that correct?

Ms. DRUYUN. That's an area that I have personally gone down twice to review at the Marietta facility. As I recall, I did not see any immediate impact to the 2000 budget. Potentially, we could see some cost growth in that arena.

I would tell you that Lockheed is very aggressively managing that and looking at some alternative plans to see how we could manage the issue of any increase in overhead rates.

Mr. TIERNEY. But the fact of the matter still remains, that it may increase their overhead rate and that may increase the cost $150 to $160 million?

Ms. DRUYUN. I don't think my numbers were that high.

Mr. TIERNEY. How high were your numbers?

Ms. DRUYUN. I do not recall. I can supply that for the record if you would like, but I believe my number was lower. The fact that there was going to be a number of management actions laid in on the part of Lockheed, it is hard to predict because of their aggressive management what that number would finally look like; we could do some estimates, and that's what we tried to do.

Mr. TIERNEY. We're going to assume that their promises of aggressive management are going to save money and just factor in that savings; is that the way this is going?

Ms. DRUYUN. I think that that is part of the equation that Lockheed is dealing with.

Mr. TIERNEY. Historically it seems that whenever we have cost increases, they are significantly higher than what we are now estimating. Why don't we use the historical models to determine the future costs, what the increases are going to be?

Ms. DRUYUN. If you look at the various cost estimating methodologies that are available to us, they basically are based on history, kind of looking in your rear-view mirror, so to speak. If you look at initiatives started by the Massachusetts Institute of Technology, such as lean aircraft initiatives, there are obviously some new paradigms to be laid in there as to how you can—for example, I will use the F–16 as a real live example.

We had a multiyear procurement that was 180 airplanes a year delivery to the U.S. Air Force. We broke that multiyear procurement around the year 1990–1991, and our number of aircraft, as I recall, dropped down around a quantity of 12 a year. If you had used traditional estimating models, it would have told you that the price of those airplanes would have gone up, when in fact that did not occur.

When you look at CAD/CAM, computer-aided design, computer-aided manufacturing, robotics, and really leaning out your production line, it will have a dramatic impact on the cost of whatever it is that you are building. And we have been able to demonstrate that in terms of when you look at travel time and an assembly line, when you relay it out, you can reduce costs significantly. And your cost models today do not have that type of data in them. They are continually being updated as we acquire that type of data.

Mr. TIERNEY. Well, historically in this program, we have underestimated what the costs are going to be. But now you're telling me that, looking forward, we are going to use these models and we are going to have a more optimistic view?

Ms. DRUYUN. No. What I'm telling you is I have production cost reduction initiatives laid in place.

If I can give you an example. The Weapon Bay Door project, this is what we call a lean aircraft initiative—it's one of our production cost reduction initiatives—we've been able to actually realize operator-distance travel has been reduced by 76 percent, parts-distance travel reduced by 52 percent, direct-touch labor reduced by 44 percent, and through-put time reduced by 58 percent.

When you take lean aircraft initiatives and go through your whole production cycle, you really look at what am I doing today and what do I need to do differently to reduce travel time, to reduce touch labor, and to significantly reduce through-put time. And those are the types of activities that are ongoing today not only in F–22, C–130J.

If you were to go out to the Marietta facility today, you would see a new manufacturing line that has been laid out that has significant efficiencies laid into it and you can see the one area where they haven't finished laying it out, and it is the difference between night and day.

Those are the types of lean aircraft initiatives that we're laying into all of our programs within the Defense Department, whether it is F–22, JSF, and even our satellite programs.

Mr. TIERNEY. Let me broaden this out for a second.

The Congressional Research Service estimates that executing all three of the current aircraft development programs could generate a projected cost of $350 billion.

Are you telling us that you think the Pentagon can afford that kind of spending?

Ms. DRUYUN. What I'm telling you, sir, is what I showed you in my sand chart. We have carefully laid out a program of modernization that lives within the total obligation authority that we have seen and that we are actually below that total obligation authority within the aircraft arena.

When you look at it from historical terms——

Mr. TIERNEY. Well, let me just give you an example. Back in March of this year, the Air Force General, Joseph Ralston, was quoted as saying one of those three planes might have to be canceled or the number of each plane reduced by as much as half. Was he wrong?

Ms. DRUYUN. I don't think I really am prepared to answer a question like that. I think that would be something that I would be happy to go get you for the record. But, you know, it depends on how he said that and the context in which he said it.

Mr. TIERNEY. Well, it is a pretty wide variance with what I think I'm hearing from you today. You seem to be telling us that $350 billion for all three of these is no problem—it comes right within your budget—and yet he is telling us that it would cause you serious reductions or cancellations.

Ms. DRUYUN. Well, I'm specifically talking to the F–22 program, as well as the Joint Strike Fighter program and our other aircraft programs. And what I have shown you is what has historically been there and what is laid out in the President's budget today. And it is very affordable, and it's based on a certain TOA assumption, which is based on the President's budget. That's what I'm saying to you, sir.

Mr. TIERNEY. Are you familiar with General Ralston's earlier comment?

Ms. DRUYUN. No, I am not.

Mr. TIERNEY. I've been told by some that the Department of Defense is scheduled to meet this month to perform a comparative analysis of the F–22 and some cheaper alternatives.

Are you familiar with that, and is that meeting still planned?

Ms. DRUYUN. There has been a study that has been undergoing since I guess around, what, George, July 1999? I have not yet seen the results of that study. And I will look forward to seeing it, I believe, next week when it is presented to Dr. Gansler.

Perhaps Dr. Schneiter could better address that.

Mr. SCHNEITER. The study is going on. It was asked for by Dr. Gansler as part of, if you will, a what-if drill, which we do quite often within the Department. We have great hope that the F–22 program will be carried out within the cost estimates and the cost caps. One has to look at eventualities if that should not come about.

What we have done is set forth on a study that looks at what might be alternatives, should that happen; and we are looking at other aircraft, such as modifications, improvements to the F–15. We are looking at the Joint Strike Fighter. I've seen some preliminary results from this, and the results show to me pretty strongly that the F–22 has a very important place in the future of our tactical aviation program.

Getting back to the point that Congressman Shays made early on, in terms of that capability, the F–22 is the only show in town. And that's part of our intent to make sure that we don't have a fair fight in the future.

So we believe we are looking at such alternatives, but the analysis that I looked at thus far indicates that very strongly that we do need the F–22.

Mr. TIERNEY. Would you excuse me 1 second.

Well, you're talking about having a fair fight. I mean, I think it's fairly indisputable at this point in time that there is no fair fight going on between what the United States has for systems and what any projected enemy might have. I know that you said there is a rough parity today with the SU–27 and the MiG–29.

If you upgraded the F–15, that would certainly put a stronger balance between any rough parity, would it not?

Mr. SCHNEITER. There's only so much you can do with the F–15. The thing that the F–22 particularly brings is a very low radar cross-section. That is a tremendous advantage in air-to-air combat as well as in protecting you against surface-to-air threats. The F–15 will never be able to be improved to anywhere near the capability of the F–22. And this is the sort of thing that we feel our forces need to have in order to be able to operate with a great advantage on our part.

Mr. TIERNEY. The way things are moving along right now, are you telling me that all of the testing will have been completed before the first production is done, the first models come online?

Ms. DRUYUN. No, sir. We have a test program that is laid out through the completion of EMD. The final testing that is done in this aircraft—right now we're in what's called development testing—the final testing will occur in mid-2002 or 2003 and it's called operational test and evaluation conducted by the AFO TEC organization within the Air Force.

What I can say to you is, if you look at the schedule that we had back in 1997 and you look at our current schedule today, yes, we have replanned our test program. It has been reviewed with all of our testers. They're the ones that have actually helped us put it together. We have been able to rephase and do some things smartly with respect to our test program.

For example, I mentioned the climatic labs. We had scheduled at the airplane, one of our test airplanes would have gone in there on two different occasions; and we were able to streamline that and get all the testing done, you know, with one visit to the climatic lab instead of two visits.

That alone, for example, helped us to recapture 6 months of some lost test time.

Mr. TIERNEY. Are you telling me that all the developmental testing will be done before the first models are produced?

Ms. DRUYUN. No, all of the developmental testing will not be accomplished before the first models are produced.

Mr. TIERNEY. So we're ahead of ourselves on that, we're going to be building things before the developmental testing is done.

Has experience in the past not shown us that sometimes that is a little over-optimistic and we end up with systems that don't meet the requirements that we had hoped for?

Ms. DRUYUN. If you were to look at other programs, like the F–18 for example, the F–15, the F–16, you would find when you enter into low-rate initial production you have not completed all developmental tests.

What you would find, though, is that you have completed a sufficient amount of tests that you have confidence that the airplanes are going to be produced will, in fact, meet the war fighters' needs.

Mr. TIERNEY. So your testimony is we have never run into difficulty before in completing the production before we have done the development?

Ms. DRUYUN. No. I would never say we have never run into difficulty in any of our programs. I believe it was either the F–15 or F–16 that had some problems. F–18 had some problems. But the problems that we have seen to date, with the testing that we have done on the F–22, including our flight testing, are well within the spectrum of what we expected.

The airplane is performing exceedingly well and to date meeting all of its requirements.

Mr. TIERNEY. Thank you.

Mr. SHAYS. Thank you. At this time, we would ask for Mr. Mica. What we're doing is we're doing 10-minute segments. We don't seem to get a red on the time, but we'll roll it over twice.

Mr. MICA. Thank you, Mr. Chairman. I appreciate your conducting this hearing on a very important subject tied into really our national security since we're trying to develop an aircraft that will give us air superiority.

And I might say at the outset that I am committed to this program. I mean, just the one page that's presented to us that says that the F–15, which I believe is almost 25 years old, is unable to operate in an advanced surface-to-air missile environment is certainly sufficient for us to be expending these taxpayer resources to develop superior capability.

I think we found in the past there aren't too many of our friends willing to help us. As the last superpower in the world, we're left to bear not only some of the costs but also provide the technology and equipment to get the job done when we have people coming after us or threatens world stability or regional stability in the world.

The major question before us is trying to contain the costs and the development of this program.

Dr. Schneiter, first of all, there have been cost overruns and I've been told that it's about a 5 percent cost overrun. Is that a fair estimate of the total amount, or is it a larger figure we're looking at now, just in a ball park range?

Mr. SCHNEITER. I suspect that, if you look at cost estimates at the time we started development, you would find a somewhat larger percentage overrun than that at this point. As Ms. Druyun's chart showed, however, you have to watch out how you define "overrun." In some cases this is caused by bad estimating on our part. We just don't know well enough what to do; we run into difficulties we didn't anticipate. A large part on the development cost increase on the F–22 was inefficiencies caused by having to replan the program.

Mr. MICA. Well, this program, as I understand, started out around 1991; is that correct?

Ms. DRUYUN. Yes, that is.

Mr. MICA. And if we're going to look at what has caused us to have cost overruns, there are going to be some various areas that have been responsible for driving the cost up. One of the things that concerns me is the way that Congress has sort of jerked this program around and Congress has changed both the requirements several times. Is that not correct?

Mr. SCHNEITER. I think the changes have been less in requirements than in funding.

Mr. MICA. We started out with what? Wasn't it an initial procurement of 700 or something? And where are we now, 300?

Mr. SCHNEITER. Oh, as far as the numbers to be procured, that has decreased; and we are 339 at this point. That will affect your average unit cost quite a bit, but should not have an effect on the development cost.

Mr. MICA. With the question of congressional changes in funding and commitment to the program, it's also been estimated to me that about 40 percent, 41 percent of some of the increase in costs could be attributed again to the congressional instability in supporting the program or changes.

Is that a fair estimate?

Mr. SCHNEITER. I would have to give you an answer for the record to be precise on that. My guess would be that the part that was caused by congressional changes would be a little bit less than that.

There were also some changes, frankly funding instabilities, that the Department caused itself.

Mr. MICA. Well, if we look at again congressional responsibility for some of the cost overruns, management responsibility, and I won't ask you that because you're really, I guess, in charge of the management or administration, another important factor would be contractor cost overruns.

As a percentage or as a factor in the total cost overruns, where does the contractor fit into this?

Mr. SCHNEITER. I think roughly about 50/50. Is that right?

Ms. DRUYUN. Yeah, I think it's close to that. If I could try to answer your question, Congressman Mica.

Mr. MICA. And I want to divide that up, because I think the contractor would have certain responsibility in funding overruns and that we could probably document. Of course, some of that may be based on changes in technical requirements and that would be the other part of the question. And I know it's hard to get a handle on all of these exact figures. But since 1991, we've had great advances in technology. And I have also known that all of the Federal agencies are prone to change the procurement requirements, at least from the technical standpoint, as projects of this nature go along.

So maybe you could give us a little bit of information about cost overruns attributed to these two factors.

Ms. DRUYUN. Yes, I'd like to do that. If I could have my EMD airframe contract cost track back up on the monitor.

What I explained earlier—and I think that perhaps you arrived a little bit late at the time—is when you look at the original contract value back in the 1991, early 1992 timeframe when we awarded the development contract, it was $10.3 billion. Today my estimate of completion of the airframe—this is the Lockheed contract—is basically $14.3 billion.

What you would see is a difference in $4 billion from my original value to where I am today. And when I break that down, I broke it down into what I term three possibilities. One was called rephasing the program, and these were a combination of congressional cuts; and they added out to $559 billion in defense cuts, which added out to $244 million, for a grand total of $803 million.

What you would find is that when you have to rephase a program, you have to stretch it, you have a standing army you have to keep in place, the programming becomes more expensive. So 15 percent of that cost growth that we see is because of the instability in funding, whether it was by the Defense Department or the Congress.

Mr. MICA. Did you say 15 percent?

Ms. DRUYUN. Fifteen percent for Lockheed. And Lockheed's actual cost growth is in the neighborhood of 18.7 percent.

I would like to put that in its proper context. If I had written the fixed-price incentive ceiling-type contract instead of a cost-type contract and I had set my ceiling at 140 percent or even 135 percent, I would still be under that ceiling today.

When you consider the technology that we have developed in this program, a very, very complex program, cost growth in an area of 18 and 19 percent is actually a good record.

I could point out other programs to you where we have seen much more significant cost growth. If you look at the engine contract, it was a smaller contract. Its original value was about $1.5 billion. Today my estimate to complete that program is about $2.4 billion. Once again, 23 percent of that cost growth that we saw was because of program-funding instability. Thirty-two percent of that was contractor cost growth.

And part of that was a collected decision made on the Department's part and I believe a correct decision. We, basically, back in 1994, as a result of testing on the hot section of the turbine, saw potential durability issues. And it's very important you build an engine that's durable and that will have low life-cycle costs. And so we decided to go ahead and redesign that portion of the engine to ensure we have long-term durability and that drove about half of that cost.

And the other bucket that you see over there, basically, refers to requirement changes. I think that is something I track on an annual basis to understand what has exactly happened within this program.

Mr. MICA. Before the Defense Appropriations Act delayed the decision on low-rate production, that decision was to have been made this month, I understand. In your estimation, would this program have been ready to enter production this month, as was originally scheduled?

Ms. DRUYUN. And my answer, sir, is yes, it absolutely was ready to enter into low-rate initial production of six airplanes.

We have demonstrated supercruise. We have conducted weapons bay open testing. By the end of December, I will have 500 flight hours of testing. You saw my previous chart, which laid out the thousands of hours of sub-system and component and sub-component testing that has taken place to date.

We've been able to demonstrate high angle of attack, post-stall flight with thrust vectoring. We've demonstrated flight at 50,000 feet. And we've greatly expanded the flying envelope of the F–22.

The fact remains, all of the criteria established in 1998 by Dr. Gansler we satisfied.

Mr. MICA. Well, I guess finally, do you believe that this program can be executed within the congressionally mandated cost caps?

Ms. DRUYUN. Yes. That's something that I track very carefully on a monthly basis that I drill down and understand. And our estimate today is, when you look at the EMD development cost cap, yes, we have cost pressures; but we have also laid in initiatives to ensure that we stay within that cost cap. The service cost estimate basically agrees that I can deliver within that cost cap. And for production, I believe that if our target price commitment curves and all of the other production cost production initiatives we have laid in place, we are aggressively managing them; and we believe we can bring this program in under the congressionally imposed cap.

And this is something we watch every single month and we report all the way through the senior Air Force management as well as to OSD and will continue to very carefully watch this and understand what is happening within the program.

Mr. MICA. Thank you.

Thank you, Mr. Chairman.

Mr. SHAYS. Thank you.

We're going to go through another round of Members. But Mr. Chambliss will ask questions, has 10 minutes; and then we'll do another round.

Mr. CHAMBLISS. Thank you, Mr. Chairman.

I want to tell you that I appreciate the opportunity that you have given me to be here today and to participate in this hearing on an issue that I am very sensitive to and, frankly, very supportive of. And your reputation of fairness and objectivity is well known to me, so I particularly appreciate your approach to this issue.

I would also say that, while I do represent the State of Georgia and the F–22 is to be manufactured in Georgia, that it is not manufactured in my district; nor is there any subcontractor manufacturing for the F–22 in my district. So my interest is not parochial. It is simply one of the fact that, as a member of the Committee on Armed Services, I have come to know and understand that, if we are to maintain air dominance, that the F–22 is a critical weapon system and that it is simply vital to the future of national security of the United States.

I'd also just like to point out that Ms. Druyun and I are very well acquainted because she testifies before my committee on a fairly regular basis, and she has had jurisdiction over the last 5 years that I've been a Member of Congress on any number of issues that I'm very interested in and sensitive to. And she'll be the first one to tell you that we've not always agreed on issues. But, as she knows, I have great respect for her abilities, particularly in the area of acquisitions. She has done amazing things in the area of acquisition and is well regarded and well respected in the Department of Defense and certainly before our committee.

Ms. Druyun, I just wanted to confirm a couple of things in the record. You alluded to this in your written statement and oral statement earlier. With respect to the need of the F–22—I don't want you to go into great detail about it, but there are some general statements that I think or general facts that are well known that I think should be brought out today. And you referred to the fact that we have been able to maintain air superiority or air dominance in our last several conflicts and if we're going to continue to do that, that the F–22 is essential.

You also stated that the F–15, which has been the vehicle by which we have maintained that air superiority, is now compared to with the SU–27, which is a Russian-made tactical air fighter. Is it not a fair statement that, while we're on parity today, that the Russians also have ready for production the SU–37, which is going to be far superior to the current F–15 and would even be superior to the F–15 with the modifications that have been alluded to as an upgrade to the F–15?

Ms. DRUYUN. Yes, I believe that's correct, sir.

Mr. CHAMBLISS. And is it not also generally known that, while the cold war may be over, that the economy of Russia is certainly not a booming economy but one of their biggest sources of income is the sale of military hardware?

Ms. DRUYUN. Yes, that's also correct. I was just there during the month of November.

Mr. CHAMBLISS. And there are other nations out there who manufacture aircraft that also have on the drawing board aircraft that are superior to the current F–15 and superior to the proposed upgraded F–15?

Ms. DRUYUN. That's also correct.

Mr. CHAMBLISS. Now, we have online—and Mr. Tierney alluded to this and it is an excellent area of discussion, and that is the area regarding the collision course we've been headed down from a tactical air, tac-air perspective.

We have the F–18–E and F, which is the most modern aircraft that's in the inventory of the Navy. We have the F–22 online. We also have the Joint Strike Fighter, which is still in R&D but is projected to come on board subsequent to the F–22.

The JSF is going to have certain assets that are also on the F–22. And is it a fair statement to say that the projected cost of the Joint Strike Fighter depends on our production of the F–22?

Ms. DRUYUN. Yes, that's absolutely correct. When you look at avionics, the F–22 will have the most sophisticated avionics system ever in any fighter aircraft. When you look at the F–119 engine, the F–119 core is being used by the Joint Strike Fighter.

Those are just two areas where these programs are dependent upon each other, yes.

Mr. CHAMBLISS. And at the same time, isn't it correct that the F–22 is going to be the first-day, first-strike, first-kill aircraft, as opposed to the JSF, not having the supercruise, not having all the sophisticated integrated avionics, so that the Joint Strike Fighter is not going to have the capabilities of penetrating behind the enemy lines to fire that first shot before the enemy ever knows they are there, which is an asset that the F–22 possesses?

Ms. DRUYUN. And clearly, the F–22 is there for air dominance, yes.

Mr. CHAMBLISS. Now also, Mr. Tierney's question related to the expense of all of these tactical aircraft, which is an issue that we have discussed within the Armed Services Committee a number of times, and it's a very legitimate question. But I want to just make very clear today that what you're here talking about is the F–22, which is not going into the inventory of the Navy, it's not going into the inventory of the Marine Corps, which the F–18 is in inventory of both those services, the Joint Strike Fighter will be going into the inventory of all three branches. And what you're talking about today and what your charts reflect is the purchase of the F–22 by the Air Force and we're not discussing the other services today?

Ms. DRUYUN. My charts reflect the purchase of the F–22 aircraft. But my charts also show those conventional takeoff and landing, we call them CTL, variant of Joint Strike Fighter. That is also built into our Presidential POM and it very much fits within the historical levels that we have seen over the past 30-year period.

Mr. CHAMBLISS. You also alluded to the per-copy cost of the F–22. And I want to make sure that everybody understands that, when this airplane was originally decided upon several years ago, that the schedule was to purchase some 750-plus aircraft.

Ms. DRUYUN. 750.

Mr. CHAMBLISS. That it was subsequently reduced to about 550 aircraft and then ultimately reduced down to about 339 aircraft, I believe is the now-scheduled purchase.

Ms. DRUYUN. Yes.

Mr. CHAMBLISS. All of those decreases contributed to an increase per-copy cost. Is that a fair statement?

Ms. DRUYUN. Yes, that is correct.

As a matter of fact, what I would add to that is I've done some unit fly away cost comparisons using base year 1999 dollars; and today, with the maximum production rate of 36 aircraft a year, we are projecting 84.7 million per aircraft. If I were to put that back up to its original number of 750, with a maximum rate of 48 aircraft a year, it would lower its cost from 84.7 million to 63.4 million.

The point is, you know, all of these aircrafts are very sensitive to their costs as to the quantity and the rate buy you do per year.

Mr. CHAMBLISS. And another method that we commonly use to lower that cost per copy is a multiyear buy. Is that a fair statement?

Ms. DRUYUN. Yes, that is correct.

Mr. CHAMBLISS. And do we have some experience to show that the multiyear buy does, in fact, lower that per-copy cost?

Ms. DRUYUN. Yes. I think the best example I can give the committee today is the C–17 program. The C–17 program entered into a multiyear procurement with the express approval of Congress, and we were able to take out approximately 5½ percent of the recurring cost of that airplane.

I think it's a very good example of what you can do when you have stability, funding stability in a program. And part of the F–22 program, when we reach 1 of 4, is by then we will have completed all operational testing and development testing, is to be able to enter into a multiyear procurement; and our estimate is that we'll be able to achieve at least a 5½ percent savings.

Mr. CHAMBLISS. And is it a fair statement that the F–22 program, from a cost perspective, is now at a very high profile in the Department of the Air Force?

Ms. DRUYUN. Absolutely. But I will tell you that it has been a very high profile for a fair number of years. I have conducted monthly execution reviews on this program before it ever came under a cost cap.

What I have found in my own experience in managing complex programs in terms of my oversight responsibilities is I meet every single month with the contractor and my program management team and I drill down into, you know, where are we in performing this contract, what is driving the costs, what is driving the schedule and are we meeting the technical requirements. And I find that when you do this month after month after month, you really get a team working and focusing together and understanding what it is that they need to do to be able to bring a program, in this case the F–22, within the cost cap.

Mr. CHAMBLISS. Did you go through a similar procedure with the C–17 program?

Ms. DRUYUN. Yes, I did. And I think the C–17 is a great example of a program that turned around because of that and took tremendous focus and efforts not only on the Air Force's part but also on OSD's part. And you are seeing the same type of teamwork today on the F–22.

Mr. CHAMBLISS. And are you comfortable again that you're going to be able to meet these caps that have been imposed by Congress on the F–22 program?

Ms. DRUYUN. In all the data that I have seen to date, yes, I am. And I have said that, I think, very clearly in my statement, as well. And this will be a program that we will continue to monitor on a monthly basis, lay in the right metrics, and ensure that we have the right mechanics in place to be able to turn this into reality. And it's hard work. This is not easy.

Mr. CHAMBLISS. Mr. Chairman, that's all I have. And again, I thank you for allowing me to participate.

Mr. SHAYS. I'm having trouble knowing what the benchmark is. And because I have trouble knowing what the benchmark is, it's harder for me to have a sense of quite where we are. And I think partly legitimately the benchmark has changed. And I realize there are benchmarks within the overall benchmark. So I'm just going to make a reference first to the GAO report that was dated March 1998, and I'm on page 8 of that.

Do you have that report? It's entitled, "F–22 Aircraft, Progress in Achieving Engineering and Manufacturing Development Costs."

Ms. DRUYUN. We're looking to see if we've got it with us.

Mr. SHAYS. Take your time. Time is something we have today. Do you have that report?

Ms. DRUYUN. Yes, we have found it.

Mr. SHAYS. Thank you.

I'm looking at the chart, table 2. Do you have that?

Ms. DRUYUN. Yes, I do.

Mr. SHAYS. In 1997, we passed the 1998 Defense Authorization Act; and it was basically the schedule that came under that; and that was a recognition that we were going to be $1.5 billion over costs, and for a variety of reasons, production levels changing and so on. And this chart points out that we were actually from that schedule of 1997 in the Defense Authorization Act we were actually 16.9 months behind on testing vehicles. And it's entitled, "Expected First Flight as of January 1998." and I think we refer to that as the Master Schedule 24; is that correct?

Ms. DRUYUN. No. That was a previous master schedule.

Mr. SHAYS. No. I'm talking the middle column. That's when you testified, you testified before the Senate committee and we were looking at 667 overruns then.

Ms. DRUYUN. Right.

Mr. SHAYS. So $1.5 billion overrun. And I'm going to accept there are going to be some overruns. So just because I say the word "overrun," I'm not losing sleep about it right yet; but I just want the full picture.

So from the first schedule, it's $1.5 billion. And then the second schedule we're looking at $666 million. And that really to me becomes the target that we're having to deal with, and it's 16.9 months. And then we're looking now at the current schedule done in June 1999 and that 16.9 months has become 28.89 months. Is that correct?

So we've gone from the first one we call the Joint Estimating Team schedule that was basically done in the defense authorization and the Joint Estimating Team anticipated a $1.5 billion overrun. Is that correct?

Ms. DRUYUN. That's what the GAO report is laying out, yes.

Mr. SHAYS. Well, but you don't disagree with that part of it?

Ms. DRUYUN. Well, he arrives at his 29.9 months—I believe that's the number—based on the 1997 schedule.

Mr. SHAYS. Which is the Joint Estimating Team schedule.

Ms. DRUYUN. Yes. That was the best schedule that—I led the Joint Estimating Team that we put together.

Mr. SHAYS. I understand. Everyone has an estimate, and every year we have new estimates; but we've got to have some benchmark. And that was the benchmark. We were looking at $1.5 billion of overruns.

Ms. DRUYUN. That's correct.

Mr. SHAYS. And then 6 months later to a year later, we then said, well, basically in March 1999 we were looking at an additional $667 million, maybe all justified.

Ms. DRUYUN. And that $667 million number was identified by the Air Force and provided to GAO along with the cost-reduction initiatives and the offsets that we set in place back in June 1998. I gave them that data in March 1999.

Mr. SHAYS. I just want to know what the benchmark is. I just don't want us to lower the bar or raise the bar. I want us to know what the benchmark is.

So we went from the Joint Estimating Team in 1997 of $1.5 billion, and then we went to what I'm told is referred to as the Master Schedule 24.

You're nodding your head. The reporter can't write that.

Ms. DRUYUN. Yes. We're using now, I believe, Master Schedule 24.

Mr. SHAYS. OK. And so when GAO did its report in March 1998, they were looking at and you and the Air Force and DOD were looking at 16.9 months at that particular time, is that correct, of delays?

Ms. DRUYUN. If you used the Joint Estimating schedules.

Mr. SHAYS. That's what I'm doing.

Ms. DRUYUN. Yes.

Mr. SHAYS. And if we use the master plan, then what, we have no overrun at that point then. I mean, what's the point you're trying to make to me? I'm trying to understand.

Ms. DRUYUN. The point I'm making to you, sir, is that we went through a DAB review in 1998. We set a new baseline.

Mr. SHAYS. Can you explain that?

Ms. DRUYUN. We went through a Defense Acquisition Board review with Dr. Gansler, the Under Secretary of Defense for Acquisition. At that point in time he approved a new baseline, the revised schedule that we laid in place. And that's where some of this confusion takes place.

Mr. SHAYS. I'm not really confused. I'm just trying to understand it. The difference is that I just want to understand what the benchmark is, and I want to understand and then how we evaluate what you're doing to that benchmark.

Ms. DRUYUN. Yes.

Mr. SHAYS. And what you want me to know is that the Joint Estimating Team's benchmark, the $1.5, we're beyond that point now, so you want me to just discard it and you want me to go to the Master Schedule 24 and use that as the benchmark.

Ms. DRUYUN. Well, I would never want anyone to disregard reality. We had a $1.5 billion cost overrun that we put together under the Joint Estimating Team. We also, as part of the Joint Estimating Team, sent out some revised schedules. And if you were to read further on, you would find, I think, a little more confusion in the avionics arena.

Mr. SHAYS. Why do you keep referring to it as confusion? We're trying to sort out facts. You keep saying "confusion."

Ms. DRUYUN. Well, I think the GAO testimony, I read it I believe last night, indicates that we're not meeting the JET schedule that we had laid out in terms of our software avionics program; and my point to you that I tried to make earlier is that we are meeting that schedule. In some cases we are exceeding it. We're doing better by as much as 6½ months.

Mr. SHAYS. You want to talk about a particular element of avionics. Why do you want to jump into that point? Why are you jumping into that point now? I just want to establish some basic points.

Ms. DRUYUN. The point I want to make, sir, when you go back and look at what was baseline in 1997 and what was the new baseline established in 1998, the facts and the data obviously change, for very solid reasons. We have gone back. Yes, his number of 29.9 months is correct if I look at the 1997 baseline he was operating off of.

This is a very dynamic program. We have gone back and rebuilt our test schedule with the test community. We have found efficiencies in that test schedule. I gave you an example of the climatic lab. If you looked in the 1997 schedule, you would have found I took two different aircraft into the climatic lab at Eglin Air Force Base.

Mr. SHAYS. Wait a minute. You're telling me something you want me to know, which I haven't asked; and I want to understand why you want me to know this right now. What is your bottom line point?

Ms. DRUYUN. My bottom line point is I think we, frankly, when you talk about the 29.9 fewer flight test months that we are missing what has happened since the GAO made their comment with respect to June 1997.

Mr. SHAYS. Would you hear me for a second? Debate this issue after I established that's the issue and then tell me that. But I'll be confused if I allow you to just keep doing that because I'm just trying to establish some basic points and then tell me those points are irrelevant. But I want to understand if they exist as a point to be discussed. And so I want to just first establish is that in the Defense Authorization Act of 1998, passed admittedly in 1997, we had the Joint Estimating Team say we are going to be $1.5 billion over. And now we're saying, OK, now we don't want it to be worse. And there may have been reasons why it's worse, and it may have been no fault of the Air Force. It may have been all of Congress's fault. I just want to understand that.

When you came before the Senate in 1998, we had a revised estimate; and we were looking at changes in dates, maybe all caused by Congress; and those changes in date I just want to understand are referred to as the Master Schedule 24. Yes?

Ms. DRUYUN. I believe Master Schedule 24 is what we're operating off of today, yes.

Mr. SHAYS. OK. By comparing that Master Schedule to the Joint Estimating Team, we found that we were 16.9 months behind in the opportunity to test a plane before we go into mass production. In other words, this is not an irrelevant bit of information. It may have been justified, but it's not irrelevant. Is that true? I mean, every month that we can test this plane before we go into production is an important month to have.

Ms. DRUYUN. That is correct, sir.

Mr. SHAYS. Now, what I'm looking at now—and tell me if I'm incorrect in that—is that we are from the baseline and we'll subtract it, too, from the baseline of joint estimation of 1997, we are 28.89 months, or basically 29 months behind. If you want me to use the Master Schedule 24, I would basically just take the 16.9 from the 28.9, say, and then I'd have had my number that we're basically, what, about 12 months behind that schedule? Is that accurate?

Ms. DRUYUN. It turns out to be about 9 months.

Mr. SHAYS. Well, we have one thing that we're going to have to look at. Because if I look at the JET estimates, the Joint Estimating Team estimates, to what you're providing us now, we come up with 28.89 months. And if you don't want me to use that baseline, I'll subtract the 16.9 from that and, I guess, basically a number. But whatever you say, your estimate is 9, we'll clarify that, 12, that bottom line we are going to use as the benchmark the master plan, we're going to use the Master Schedule 24 as the baseline; is that correct?

Ms. DRUYUN. Yes, that is correct.

Mr. SHAYS. Thank you.

Would you look at under the F–22 Production Cost Plan, this one here. They are not numbered. I wrote its the 11th on my page.

Ms. DRUYUN. Yes, I have two charts, one for Lockheed and one for Pratt & Whitney.

Mr. SHAYS. I have the F–22. It's the chart you showed.

Ms. DRUYUN. One is entitled, "F–22 Production Costs Reduction Plan Savings."

Mr. SHAYS. Yes. Let's put that one up.

Ms. DRUYUN. And that refers to Lockheed Martin's program for the airframe.

Mr. SHAYS. Oh, it is the airframe.

Ms. DRUYUN. Yes.

Mr. SHAYS. Now, let me just, since you introduced that, just ask you. There's the engine. You have Pratt & Whitney. The other participants in the construction of this aircraft, the major participants, would be who?

Ms. DRUYUN. We have two development contracts, one for the airframe. Lockheed Martin is the prime contractor. Boeing is a major subcontractor that builds part of the airplane. And then we have an engine contract with Pratt & Whitney. Those are the two major development contractors.

Mr. SHAYS. Who's doing the avionics? Or is it many doing the avionics?

Ms. DRUYUN. Avionics is under the Lockheed Martin contract. Boeing has lead for much of the avionics under that contract.

Mr. SHAYS. Would you just explain to me, of the airframe and the engine, who's at this point able to stay within production costs and meet the timeframes? Can you compare the two?

Ms. DRUYUN. If I look at the production-cost reduction initiatives that have been laid in place by Lockheed, in July 1999 this chart shows you that I was looking at savings in the range of approximately $16.9 billion. When you go back to the previous chart, the point that I had was that I needed at least $15.1 billion in cost-reduction initiatives to stay within the cap portion of the production program. And for Pratt, I need $2.5 billion. And to date they have $4.1 billion worth of production initiatives laid in place.

We're very actively tracking these. You have to put the two of them together to arrive at the total production cap.

Mr. SHAYS. I was asking another question. It might have been hard to follow my train of thought. I was getting distracted. But since you have brought it up, I'm just curious to know has Pratt & Whitney, for the most part, kept on schedule? Has it kept on schedule? Is the engine the biggest challenge, the least challenge in your whole effort?

Ms. DRUYUN. The engine, if I took you back in history, was a challenge back in 1994 and 1995. Since that time, if I were to show you the earned value charts that I look at on a monthly basis, their schedule looks good and their costs are holding within the spectrum that we had laid out.

Mr. SHAYS. Is the avionics the area where we have the greatest delay?

Ms. DRUYUN. If you look—and I will go back to the JET schedule that was laid out in June 1997—no. We are actually doing better than what we thought we would do under the original JET schedule and avionics. We had problems back in 1997, for example, with the wings, for example. These were large titanium castings that attach the wings to the aircraft body. We, in fact, had casting problems. We have those problems behind us. We went out and qualified a second source. We now have two sources who are successfully building those large titanium castings.

And I think that's where perhaps we tend to get a little bit confused. Back in 1997 we did have problems with the wings. We laid a new schedule in place once we were confident, and we had proven that we had qualified a second source who, in fact, could help produce these castings.

Mr. SHAYS. The whole purpose of this hearing is to not get confused. So you can keep saying, "confused, confused, confused," but we hope to sort it out.

On this chart that we had on 11, which is the "F–22 Production Cost Reduction Plan Savings," just describe to me what the $16.9 billion means; and then I want to ask you two questions.

Ms. DRUYUN. OK. The $16.9 billion basically lays out the cost-reduction initiatives that we have laid in place since the JET concluded its activities in June 1997. They are broken up. If I can walk you through some of these areas, Production Cost Reduction Initiatives. That's kind of the blue-green. It's basically producibility improvement projection. We have Diminished Manufacturing Sources. You have an area that is called "Lean." This is where you apply lean principles to the factory. We have Material Efficiencies. This is where I described, instead of just buying material for the F–22, you roll it into all the material that Boeing, for example, or Lockheed would require across the board in their aircraft factories, and you're able to leverage much greater pricing with your suppliers, get much better pricing.

We have something called PBC, Performance Based Contracting. This is where you take your single performance spec and all the acquisition reform concepts that we have laid into place. Product Support. This is where you would rely on contractor logistics support as well as comprehensive training and a much stronger warranty program before we actually begin establishing our depots.

We are looking at a multiyear procurement, which would start at high-rate production, and we're looking at using ways basically about a 5 percent savings a year. That's what that represents.

And then rate savings due to Joint Strike Fighter. Regardless of who wins the Joint Strike Fighter competition, there will be rate savings, and that is basically what we have laid in there.

Mr. SHAYS. Is that primarily the engine?

Ms. DRUYUN. Yes, that's also true for the engine as well, for both airframe and engine.

Mr. SHAYS. Then the last is the multiyear?

Ms. DRUYUN. The last is the multiyear.

Mr. SHAYS. Which is?

Ms. DRUYUN. This would be once we have satisfied all the requirements in development, successfully completed it, we would be able to write a multiple year contract like we have for the C–17, to get stability—funding and stability in the production line, and you are able to reduce the average recurring price by approximately 5 percent. That's what that represents.

Mr. SHAYS. Both the multiyear and the Joint Strike Fighter rates are gigantic assumptions, correct? You don't know what the multiyear contracts will be?

Ms. DRUYUN. If you were to use historical models, sir, 5 percent is right in line with those historical models. That would be dependent upon the Congress approving a multiyear procurement. That authority does not rest with us.

Mr. SHAYS. I understand that. And I understand you have to make assumptions, believe me.

Ms. DRUYUN. Yes.

Mr. SHAYS. And I understand that when Congress votes out weapons systems that are greater than our 5-year budget allows, Congress decides—and Defense goes along with it—decides to push it to the 6th and 7th year, and we increase costs tremendously. But frankly that happens because both Congress and Defense want these weapons systems, and they don't want to see a 5-year budget because we would be over our weapons systems. So it's kind of an agreement that occurs between Congress, the administration and the Defense Department.

Would you turn please back to the chart that was on the board, Avionics Software Delivery Dates. I'm interested to know why you didn't put the JET schedule in there. You put everybody else's schedule in. Was there just an oversight?

Ms. DRUYUN. I tried to simplify the chart. I find you can only put so much stuff on a chart. But if I could take you back to the JET schedule, for Block 2.0, we had projected the—the JET laid out July 2000. The JET for Block 3.0 laid out April 2001. And for Block 3.1, the JET laid out September 2001.

Mr. SHAYS. If I am looking at the third Block, Block 1.1, based on the JET schedule, would be 4 months behind?

Ms. DRUYUN. No. No, sir. It has already been delivered.

Mr. SHAYS. January 1999?

Ms. DRUYUN. Its need date, according to the JET, was June 11, 1999, and it was delivered May 28, 1999.

Mr. SHAYS. So you're saying it's 1 month ahead?

Ms. DRUYUN. Yes.

Mr. SHAYS. On Block 2/3, the seventh Block—sixth Block down, what was the schedule on that? Didn't the JET say January 2000, it anticipates it?

Ms. DRUYUN. Are you referring to the Block that says "Sensor Physics?"

Mr. SHAYS. Yes.

Ms. DRUYUN. This was a change to the JET. This was an additional Block of software that we added in to put it into the avionics integration lab and into the flying test bed. This was a risk reduction Block that we laid in.

Mr. SHAYS. Let me put it in my words. Are you saying the JET doesn't even have this estimate?

Ms. DRUYUN. The JET, that's correct, did not have something for a Block 2/3S.

Mr. SHAYS. The last two blocks, do they reflect the delays that already occurred?

Ms. DRUYUN. The last two blocks, I assume you're referring to Block 3.0 and 3.1?

Mr. SHAYS. Yes.

Ms. DRUYUN. Taking you back to the JET estimate, to the JET schedule, we are ahead of the JET schedule for Block 3.0. The JET schedule was April 17, 2001. We believe we will deliver that by October 30, 2000. And the metrics I am tracking show that we are very much on track for that to occur.

The Block 3.1, the JET said September 2001, and we believe that we will be able to deliver it in June 2001 which is on or ahead of schedule.

Mr. SHAYS. They both would be. Let me just ask you one last chart and I thank my colleague for his patience. If you would look at chart, Air Vehicle October 1999 Final CPR.

Ms. DRUYUN. Is this the GAO report, sir?

Mr. SHAYS. I'm looking at your report. I'm looking at page 8—not page 8, I just numbered it. It's just helpful to have page numbers.

You have got it on the board there.

Ms. DRUYUN. OK.

Mr. SHAYS. The December number for commitment, which is the projection, is $225. Your number in October is $222. These are in dollars, $222 million. The cost variation now is $238 million. What do you think it is going to be in December?

The bottom line, the number will go up from $238, we are already going to be above it, from $225 to $238. The question I have is, is it going to be much higher than $238?

Ms. DRUYUN. I laid out projections through really the end of the program. I don't remember what my December projection was, but I expect I will be slightly above it. Some months I am above it, other months I come within it.

Mr. SHAYS. Above $238?

Ms. DRUYUN. I would have to get you the exact number, but I think it was around $245 million.

Mr. SHAYS. About $20 million over, give or take?

Ms. DRUYUN. Yes.

Mr. SHAYS. Is that significant?

Ms. DRUYUN. No, I don't think it's significant. Part of the bump-up that you saw from $227 in September, the real cost variance, to October, to $238, that's $11 million, the bulk of that is a one-time charge because of a bonus that Boeing paid to all of its employees when they wrote a new union agreement. So that's a one-time charge. That's why you see this bump-up that occurs like that. But we have typically—what we have typically experienced is in the neighborhood of a $6 million a month variance from the previous month.

Mr. SHAYS. You just triggered a question. I make an assumption that estimates are allowed to vary by the cost of living. So as the cost of living goes up, we can change estimates.

How does it work—what is the incentive to Boeing to control costs if they can basically pass on the costs to you and me and everyone else?

Ms. DRUYUN. That's a very good question. If I could try to explain how we do inflation estimates on this program—actually we do it in all defense programs—we have our own inflation rate that we use in building our budget. It is passed down to us, I believe, from the Office of Management and Budget. The inflation rate that we have basically built into this budget is less than—I believe it's less than 1 percent. So when we put together the estimate, we had to use Department of Defense inflation rates.

If you look at, and this is an interesting anomaly, when you look at the DRI, this is the data resource organization that captures all the labor statistics, for this type of work typically the inflation rate that you see with your workers, they get an average of 3 to 4 percent increase per year. The way we have to price it out, I basically have to price it out at less than 1 percent a year. And we track very carefully the recent agreements that Boeing has struck up, that Lockheed has struck up, that all of their major subs have entered into, and they are very much in line with the Data Resources Institute percentage.

This is a challenge to us on this program, and that's why these cost reduction initiatives are so important, because these cost reduction initiatives have to offset the difference between the standard inflation rate versus the inflation rate that we use.

Mr. SHAYS. Just let me ask that question, part of the question again. You answered part of it.

If Boeing ends up passing on, agreeing with its employees to give them a bonus or salary increases, we're pretty much locked into Boeing right now. So do we just absorb that cost?

Ms. DRUYUN. In a cost-type contract, you do. EMD, our development contract, is a cost-type contract.

Now, when I look at my PRTV contract No. 1 and my PRTV contract No. 2, those are firm, fixed price contracts. I do not absorb those costs; that contractor absorbs those costs.

Mr. SHAYS. Thank you very much.

Thank you, my friend. You have the floor as long as you may want.

Mr. TIERNEY. I will not want it that long.

Can you just repeat for me again what the cost per F–22 is anticipated to be at this time?

Ms. DRUYUN. Our estimate today of the average unit flyaway cost is $84.7 million apiece.

Mr. TIERNEY. As of this time, what are the number of F–22s that the Air Force has committed to procure?

Ms. DRUYUN. Our development program, we are receiving nine air vehicles and two ground test vehicles, the first production readiness test vehicle contract, two vehicles, and the second production readiness test vehicle contract, six vehicles. So it is 8 and 9; it's a total of 17 vehicles.

Mr. TIERNEY. Nine plus two plus two plus six, right?

Ms. DRUYUN. Right. I really don't count the ground test vehicles as air vehicles.

Mr. TIERNEY. So you have 17 vehicles that are committed for right now.

What is the Air Force commitment to procure long lead materials, for how many more F–22s?

Ms. DRUYUN. We have a DAB review, a DAE review scheduled, as Dr. Schneiter mentioned, this Thursday, the day after tomorrow, and we will review the status of the program; and we have been authorized by the Congress to obligate $277 million of procurement funding for long lead of 10 aircraft for next year.

Mr. TIERNEY. So the answer is 10?

Ms. DRUYUN. Yes, 10 aircraft, $277 million long lead.

Mr. TIERNEY. So we planned originally for, what, 4,337 hours of flight tests overall for this project?

Ms. DRUYUN. I don't recall, sir. I would have to get that for the record.

Mr. TIERNEY. Does that sound about right to you?

Ms. DRUYUN. Yes, that's about right.

Mr. TIERNEY. What percentage of that planned flight testing will we have completed when all this production has taken place for these 17 plus 10?

Ms. DRUYUN. By the end of this month, I expect we will have 500 flight hours, flight test hours. By the end of December 2000, it will be over 1,000 flight test hours.

Mr. TIERNEY. Given the complexity of this system, are you comfortable that that is a sufficient testing prior to production?

Ms. DRUYUN. Yes, I am, particularly given the test philosophy we laid into this program at its inception. Testing at the lowest component and working your way up to the system level, extensive modelling and simulation, and if you were to compare this airplane today with respect to an F–15 and F–16 or an F–18, we actually today have more flight test hours than they did when they entered into low rate initial production.

Mr. TIERNEY. Earlier you and Mr. Chambliss were having a nice little discussion back and forth, you mentioned the dependency of the Joint Strike Fighter and the F–22, and you mentioned it again on your Production Cost Reduction Plan Savings chart under the orange where you had JSF rates, you said to be a greater savings in both the airframe and the engine. Would you explain that a little more for me?

Ms. DRUYUN. The decision was made when we began the Joint Strike Fighter program to use the same core engine that we're using on the F–22. As you know, the engine is still in development for F–22. But that core engine is what is being used by two competing contractors with Pratt for their designs on Joint Strike Fighter.

The avionics system that we have laid in place, as I said, is the most complex avionics system in any fighter aircraft manufactured to date. When it is all said and done, my avionics system will have about 2 million, 2.2 million lines of code. The Joint Strike Fighter is looking at obviously an even more complex avionics system, and theirs could be perhaps double that amount. It depends on the individual contractor's design. But being able to do things like full sensor fusion, would be the first time ever we will have demonstrated this on the F–22, and it will be a key part of what they will be doing in Joint Strike Fighter.

Mr. TIERNEY. This would be true whether you are moving directly to the JSF and just doing all of this research and development for that alone and not producing the F–22, right?

Ms. DRUYUN. I guess my point is, the work we're doing today on development, proving out that you can do this complex sensor fusion and that you can take the core engine that we have developed in F–22 is a great risk mitigator for the Joint Strike Fighter program.

Mr. TIERNEY. All the risk goes into the F–22, but if you went straight into the JSF, it would go into the JSF, right?

Ms. DRUYUN. No, I think very clearly the two programs complement each other in terms of the warfighters' needs.

Mr. TIERNEY. That may be the case, but in terms of production and the cost, if you were going to go directly to the JSF, you would just do all of the research and development for the avionics and for the engine and whatever directly for that jet?

Ms. DRUYUN. That's correct.

Mr. TIERNEY. The savings come only because you decide to double up, you're going to use the same for the F–22, the same for the JSF, have larger numbers and spread the cost over that. But if you didn't have the production of the F–22, then obviously you would save all of that and you would be moving right to the JSF.

Ms. DRUYUN. I think you would have a more complex development program with the Joint Strike Fighter.

Mr. TIERNEY. Somewhat, sure.

Ms. DRUYUN. Yes.

Mr. TIERNEY. But other than that, basically I am on point?

Ms. DRUYUN. Yes, it just adds to the complexity and to the risk.

Mr. TIERNEY. Dr. Schneiter, we talked a little bit earlier about the F–15 Eagle and upgrading it and not upgrading it. What upgrades on the F–15 Eagle could reasonably be contemplated?

Mr. SCHNEITER. If you were going to upgrade it, probably one of the first things you would do is give it an improved radar. You would also do some things to upgrade other aspects of the avionics. You might do some things, if you could, to reduce its observability.

Mr. TIERNEY. If you did all of those improvements, all those upgrades on that, how would it compare to what your projections are for the F–22 in terms of maneuverability?

Mr. SCHNEITER. I don't think it would be much different in terms of maneuverability. The thing you would not have, though, in the case of the improved F–15 is anywhere near as small a radar cross-section. You would also not have the ability to fly supersonically without using afterburner. And the big advantage of that is, if you have to use afterburner to go supersonically, your fuel flow is extremely high, and so you can only do that for a very short amount of time.

What the F–22 allows you to do is to use supersonic flight for a longer period of time, because it uses far less fuel than you would need with afterburner.

Mr. TIERNEY. Is it projected that the JSF will have those capabilities?

Mr. SCHNEITER. The JSF will have a low radar cross-section. It will have, we expect, an excellent avionics suite. We do not expect that it will have the so-called supercruise capability, and that is one of the reasons that it does not do nearly as well in an air-to-air role.

Mr. TIERNEY. And in the view of the Department of Defense, is it not possible to give it that supercruise capability?

Mr. SCHNEITER. I don't think it would be possible to do it and still keep within the cost targets which we have for the Joint Strike Fighter. We expect to build a very large number of Joint Strike Fighters. We need them to replace aging aircraft in the Air Force, in the Navy, and in the Marine Corps. Since we will be building very large numbers, it's very important that we keep the cost down, and so we give it only the requirements that it needs to do its principally air-to-surface role. That does not include supersonic flight without afterburner.

Mr. TIERNEY. If you had a savings in the F–22, production of the F–22, would it not make it more reasonable to then adjust the cost of the JSF to maybe include some things that may be a little more costly?

Mr. SCHNEITER. I think the savings we're talking about in the F–22, that Ms. Druyun was referring to, were savings that we need to accomplish in order to buy the aircraft——

Mr. TIERNEY. The savings I'm talking about, just hypothetically, if we skipped over the F–22 and went to the JSF, you would have substantial savings from the F–22 and then might it not be reasonable to do some other things with the JSF?

Mr. SCHNEITER. You would have some amount of money left. The development program, though, on the F–22 is getting close to complete.

Mr. TIERNEY. When you say "some money left," you would have a lot of money left, right?

Mr. SCHNEITER. You would have a lot of money left, but if you then take that money and divide it by 3,000 aircraft, you would find you wouldn't want the cost of the aircraft to go up very much. So I think you would be very disinclined to give a lot of that additional capability to the Joint Strike Fighter.

Mr. TIERNEY. What countries do you think right now are going to have anything even close to, comparable with the F–15, as you have talked about it might be modified or upgraded?

Mr. SCHNEITER. I think the Russian aircraft that were referred to earlier certainly fall in that category.

Mr. TIERNEY. Does it exist or the ones that are on the board?

Mr. SCHNEITER. I believe they exist. The SU–27 does exist.

Mr. TIERNEY. They are under parity with an existing F–15, but not with an upgraded F–15, right?

Mr. SCHNEITER. I think parity is a rough term here. The thing we're talking about in the F–22 is something that is a large step difference.

Mr. TIERNEY. I'm talking about an upgraded F–15.

Mr. SCHNEITER. You would still expect to have rough parity among the F–15 class of fighter and the fighters that you would expect to have from other countries.

Mr. TIERNEY. Maybe I'm not being clear, maybe I'm not hearing you correctly.

You have the so-called "rough parity" according to the report we were given this morning, rough parity between the Su and the MiG and the F–15 as it exists now?

Mr. SCHNEITER. Yes.

Mr. TIERNEY. If you were to upgrade the F–15 Eagle to some of the points you made just a few moments ago, then do you see anything that exists now that even is close or at rough parity with it?

Mr. SCHNEITER. I would expect if we would improve our aircraft, others would improve their aircraft as well. I think, in any event, we would not have the degree of superiority that we need to have in order to have air dominance, even with the improved F–15.

Mr. TIERNEY. Do you feel we had air dominance in the last conflict that we had?

Mr. SCHNEITER. I think we did, yes.

Mr. TIERNEY. I don't have any further questions.

Thank you, Chris.

Mr. SHAYS. I don't have many more but I have a few.

The F–22, the EMD cost, it is No. 6, page No. 6 of mine.

Would you identify the Government Management Reserve number? That seems to be a new number for us. We're not used to that number. You have the chart. Take your time. It is what you were going through, I believe, and what you showed us. We wanted you to go through all your charts without our interrupting you, but we wanted you to make reference to them now.

We appreciate sincerely the information you are providing. It helps us ask our questions. What is the Government Management Reserve? It is $1.3 billion or $130 million? That's a new number for us, or we are just being exposed to that.

Ms. DRUYUN. When I testified at the SASC TACAIR hearing on March 17th, I showed the figure $666 million. What you see here in March 1999.

Mr. SHAYS. That is the overall chart?

Ms. DRUYUN. Yes.

Mr. SHAYS. And that number is based since the Joint Estimating Team, that $667?

Ms. DRUYUN. That's correct. The $130 million management reserve I alluded to at my hearing back in March.

What we have done because the Congress has capped this program and development in particular, normally I have to tax all of my programs for small business innovative research taxes. They are across-the-board taxes that you have to do; whenever we cap a program in development, we exempt it from having to pay those costs. That has generated another $130 million worth of management reserve for a program manager to use as we complete the development program.

Mr. SHAYS. When you say "alluded to," that's a dangerous word. What does that mean?

Ms. DRUYUN. I did not come out and state what the exact number was, because at the time there were a number of contractors, both of my contractors, Lockheed and Pratt, were sitting in the audience, and I did not feel it was appropriate at that time to openly speak to it. I made reference to the fact that we had additional Government Management Reserve, and that's what I am showing, sir.

Mr. SHAYS. That's not a savings. That's just basically a way to meet the cost. It's an added fund that you can draw on?

Ms. DRUYUN. Right. Because the Congress capped this program. Whenever you cap a program, it does not make good management sense to us to tap into that to pay some of the taxes that are required on an annual basis. I'm doing the same thing right now in the Joint Strike Fighter program as well.

Mr. SHAYS. Would you just—I am just trying to think of the impact. I just want to make sure I understand it. The bottom line is, it's a reserve that you can tap into, so you're not making a savings—and I'm not saying you should, I'm just trying to understand it—you are not making a savings in the program, an offset in the program, you're drawing on reserve to help meet your numbers?

Ms. DRUYUN. That's correct, to offset the worst-case cost growth that I identified back in March 1999.

Mr. SHAYS. Thank you. When I look at external stores deferral, deferral means you didn't save, but you postponed. That is still in that chart there?

Ms. DRUYUN. Yes, that's correct.

Mr. SHAYS. It is $140 million?

Ms. DRUYUN. Yes.

Mr. SHAYS. So the answer to the question is yes to my question. So it is $140 million that we are going to incur, but we are going to incur later, outside the caps?

Ms. DRUYUN. That's correct. That was a decision that we made with Air Combat Command.

Mr. SHAYS. But we're going to have to come up with that money some way, sometime.

Ms. DRUYUN. It's laid into the program. We always do what we call follow-on test and evaluation. And these airplanes will continually go through additional testing as long as we have them in inventory.

What we agreed we would do——

Mr. SHAYS. This primarily was weapons systems? Does this include the deferral of the weapons?

Ms. DRUYUN. No, it does not include the deferral of weapons. It only includes—excludes—let me tell you what we are doing as part of the development program so you can understand it.

We're going to certify the full compliance of weapons systems—AMRAAMs, M9X, our gun, the thousand-pound JDAM, which is all internal carriage which you need so you can have stealth performance. You hang that stealth on the outside of the airplane, you don't have stealth performance. This represents the go-to-war scenario configuration that our warfighters will take with the F–22.

So as part of the development program, we're going to certify the full stealth combat configuration and the basic ferry configuration. What we're going to postpone and do as part of follow-on test and evaluation, because we would never take this airplane to war that way is the external carriage of AMRAAMs or JDAMs, basically the external carriage of additional munitions or missiles that you would carry.

Mr. SHAYS. That won't be stealth?

Ms. DRUYUN. That's correct. As long as you hang that on the bottom of the airplane, it is no longer stealth.

Mr. SHAYS. Let me be clear. So what comprises the external stores deferral?

Ms. DRUYUN. The cost to go through the full op test certification is $140 million and that is what we have deferred to follow-on test and evaluation.

Mr. SHAYS. But it wasn't included in the original EMD estimates, originally?

Ms. DRUYUN. I believe it was.

Mr. SHAYS. OK. Are there any other deferrals that show up in any of these other numbers or are deferrals only in this number of $140?

Ms. DRUYUN. To the best of my recollection, it is only in this number.

Mr. SHAYS. Let me just conclude with an observation, and I'm happy to have you make a response to it.

You use a per plane cost, per copy cost of $84 million. If we used all the research and development, we would come up with $184 million. Make your argument as to why we should look at $84 million and not $184 million.

Ms. DRUYUN. We have always reported the average unit flyaway cost with respect to all of our aircraft. I would tell you every single year when we brief the House Appropriations Committee and have hearings, I basically show three sets of numbers.

Would you pull out my backup chart.

Mr. SHAYS. Do I have that chart?

Ms. DRUYUN. I believe you do.

Mr. SHAYS. It was part of this one?

Ms. DRUYUN. It should have been. Did we include backups?

Mr. SHAYS. I can't read it there, so if someone could give us a chart.

Do you have any other backup charts you want to show us? They may be the most interesting.

Ms. DRUYUN. No. I had a couple of other backup charts, but I don't think you would find them to be as interesting.

What we basically do on an annual basis is report the flyaway cost, the unit procurement cost and the program acquisition unit cost. We show that in fiscal year 1999 dollars as well as then-year dollars. We give that every single year to the appropriations and authorization committees.

Mr. SHAYS. So the program acquisition unit cost would be your entire cost of everything divided by the number of planes?

Ms. DRUYUN. Yes, and it includes your RDT&E, your military construction, anything that was ever spent with respect to the F–22 program.

But a true measure of a program is really its flyaway cost. This is the actual recurring cost and nonrecurring startup charges to actually build an airplane.

Mr. SHAYS. Thank you.

I thank you. I would invite each of you to respond to any question we didn't ask that you wanted to answer or any other comment you want to make.

Mr. SCHNEITER. I have nothing more.

Ms. DRUYUN. I have nothing more. Thank you, sir.

Mr. SHAYS. Thank you both very much. I really appreciate both of you being here and your testimony.

I would also like to thank our court reporters; we had Ryan Jackson and Bill Odom. On loan to us, Major Mike Mueller, who was assisting us in the charts, and I thank you for doing that. I thank you for having the charts; it was very helpful. Don Springman, who is the senior evaluator, GAO, he was helpful too, and I thank him.

All of you have a beautiful day, a Merry Christmas, a Happy New Year, a Happy Hanukkah, and a lovely day today. Thank you.

[Whereupon, at 12:45 p.m., the subcommittee was adjourned.]

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